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New species of the genera *Cyrtusa*, *Pseudcolenis*, *Cyrtoplastus* and *Agathidium* (Coleoptera: Leiodidae: Leiodinae) from China

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Abstract. *Cyrtusa andreasi* sp. n. (Sichuan), *Pseudcolenis* (*Pseudcolenis*) *dilatata* sp. n. (Shaanxi, Sichuan), *P.* (*P.*) *laticornis* sp. n. (Shaanxi), *P.* (*P.*) *neglecta* sp. n. (Sichuan, Yunnan), *P.* (*P.*) *shannae* sp. n. (Shaanxi), *Cyrtoplastus schuelkei* sp. n. (Sichuan), *Agathidium* (*Neoceble*) *daxuense* sp. n. (Sichuan), *A.* (*Neoceble*) *shaanxiense* sp. n. (Shaanxi), *A.* (*Agathidium*) *giganteum* sp. n. (Sichuan), *A.* (*Agathidium*) *janatai* sp. n. (Gansu) and *A.* (*Agathidium*) *puetzi* sp. n. (Shaanxi) from China are described. Chinese species of the genus *Pseudcolenis* Reitter, 1884 are keyed. Two species groups: *Pseudcolenis* (*Pseudcolenis*) *bouvieri* group and *P.* (*P.*) *hilleri* group are stated newly. New records of *Colenisia similata* Angelini et Švec, 1994 from Shaanxi, *Pseudcolenis strigosa* (Portevin, 1905) from China (Sichuan, Shaanxi), *Anisotoma krali* Angelini et Švec, 1994 and *Agathidium* (*Agathidium*) *gonggaense* Angelini et De Marzo, 1998 from Sichuan are presented.

Taxonomy, descriptions, distribution, Leiodinae, *Cyrtusa*, *Pseudcolenis*, *Cyrtoplastus*, *Agathidium*, China

INTRODUCTION

In recent years many species of Leiodinae have been recorded or described from China by Angelini & Švec (1994, 1995), Angelini & De Marzo (1988), Angelini & Cooter (1999), Angelini (1999) and Švec (2000). In this paper further new species are added and faunistic data are recorded.

MATERIAL AND METHODS

Through the kindness of Alexandr Pütz (Eisenhüttenstadt), Stanislav Bečvář (České Budějovice), Miroslav Janata (Praha) and Zbyněk Kejval (Domažlice) we have been able to study interesting material comprising 16 species (101 specimens) from China among which we recognize and describe 11 species new to science.

The specimens mentioned in this paper are deposited in the collections of Angelini (AC), Švec (SC), Schülke (SCHC) and Pütz (PC).

The material studied was compared with the specimens including the types of Chinese species deposited in the collections of both authors, with the types of *Pseudcolenis aciculata* Daffner, 1988 deposited in the collection of the Hungarian Natural History Museum Budapest (HNMB) and with the specimens of *P. bouvieri* (Portevin, 1903), from India, determined by Daffner (HNMB).

The range of body length presented in descriptions of individual species was measured from all specimens in the type series, other measurements and ratios were taken from the holotypes. The measurements, except data concerning width of elytral strigosity in *Pseudcolenis* were approximated to the nearest decimal place, the ratios were reckoned from unaproximated numbers.

TAXONOMIC PART

Leiodini Fleming, 1821

Four genera of the tribe are currently known from China They can be keyed as follows

1 Head with clypeal line 8th antennal segment visible but smaller than other segments of club (20 species) *Leiodes* Latreille 1802

– Clypeal line absent 8th antennal segment extremely small to invisible 2

2 (1) 8th antennal segment visible (In China only 1 species *Liocyrtusa nigra* Angelini et Svec 1995) *Liocyrtusa* Daffner 1982

– 8th antennal segment not visible 3

3 (2) All tibiae narrow (In China only 1 species see below) *Cyrtusa* Erichson 1848

– Meso and metatibiae strikingly dilated (In China only 1 species *Z sinensis* (Portevin 1942) *Zeadolopus* Broun 1902

Cyrtusa Erichson, 1841

No species of the genus *Cyrtusa* was hitherto known from China From China was under genus *Cyrtusa* originally descibed *C sinensis* (Portevin, 1942) later transferred to the genus *Zeadolopus* Broun, 1902

Cyrtusa andreasi sp. n.

(Figs 1–4)

TYPE MATERIAL Holotype male China Sichuan Daxue Shan Gongga Shan Mt Hailuogou Glacier Park 29 36 N 102 04 E river valley ca 1 km above Camp 1 2100 m 28 31 v 1997 A Putz lgt paratype 1 female China Sichuan Daxue Shan Hailuogou Glacier Park Camp 1 2100 m 29 36 00 N 102 03 35 E 27 31 v 1997 M Schulke lgt Holotype deposited in PC paratype in SC

DESCRIPTION Very short oval Brown, head black, lateral margins and base of pronotum red brown, mouth-parts, legs and antennal segments 1–6 red, club infuscate Underside brown, femora yellow-brown

Length 1 9–2 3 mm, holotype 2 3 mm, head 0 4 mm, pronotum 0 6 mm, elytra 1 3 mm, antenna 0 5 mm Maximum width of head in holotype 0 6 mm, pronotum 1 1 mm at base, elytra 1 2 mm at base, 1 3 mm at basal third

Head As in Fig 2, with distinct dense punctuation, without microsculpture Punctures irregularly distributed, spaced by 1–4 times their own diameter More closely spaced at internal margin of each eye and with a punctate groove bordering the short convergent temples posteriorly, margin of head anteriorly Groove interrupted at middle of anterior margin of head Anterior margin of clypeus bearing small medial notch (Fig 2) in holotype, simple in female paratype Ratio of length of antennal segments 2 to 11 (the 2nd equal to 1 0) = 1 0–1 0–0 5–0 5–0 4–0 9–not visible–0 9–0 8–1 1 Ratio of width of club segments 7th to 11th (7th equal to 1 0, 8th not visible) 1 0–not visible 1 1 1 2–1 0 Ratio of width length of the antennal club segments = 2 1–not visible 2 3–2 9–1 7

Pronotum Widest at base, lateral margins roundly narrowed toward anterior angles Posterior angles very blunt tightly rounded in dorsal view In lateral view, posterior angles very blunt, tightly rounded Margins of pronotum curved to anterior angles viewed laterally Base straight medially, laterally obliquely angled to posterior corners Pronotum without microsculpture, more finely and sparsely punctured than on head, punctures separated by about 3 5 times their own diameter Sides of pronotum with several small impunctate areas Anterior and lateral margins bordered

Scutellum With some distinct punctures like those at elytra Numerous very small fine punctures spaced by about 1–2 times their own diameter basally

Elytra Widest at anterior third Lateral margins not visible from above Elytra without microsculpture Without regular striae Punctuation strong and dense Punctures separated by twice their own diameter on disc, toward base and apex of elytra they become finer and sparser, toward lateral sides larger and denser, separated by about 0 5–1 0 times their own diameter Lateral margin of elytra grooved, with punctures as large as those at the sides of the elytra bearing rare short setae Elytral base near scutellum densely punctate with small punctures similar to those on the base of the scutellum

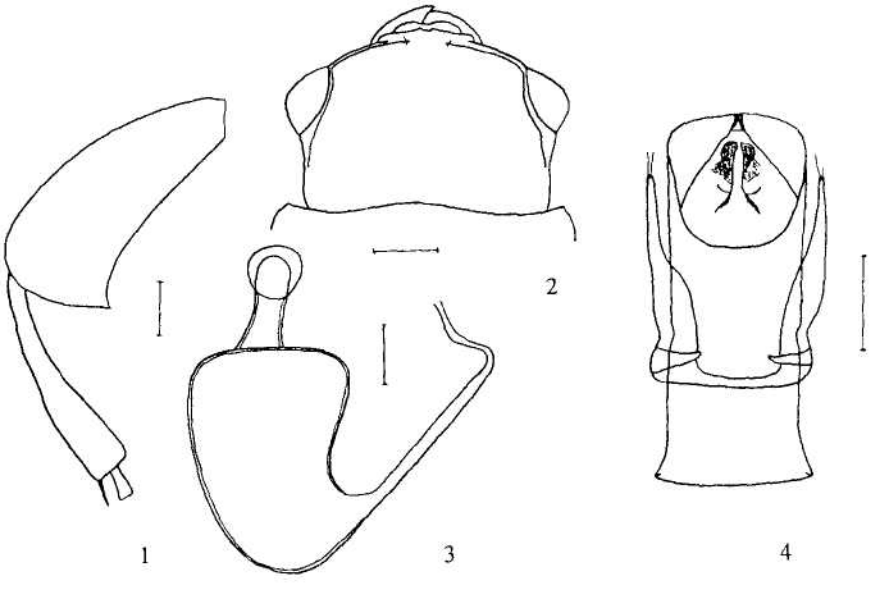
Metasternum Coarsely, regularly punctured at sides, punctures spaced by about 0 5–1 0 times their own diameter toward central part punctures become smaller and sparser Central part of metasternum scarcely punctate, punctures separated by 4–5 times their own diameter

Ventrites without striking characters Closely and strongly punctured, punctures of normal size, separated by less than their own diameter

Metathoracic wings fully developed

Legs First four segments of anterior tarsi and mesotarsi very slightly dilated in male Anterior tibiae apically 3 times as wide as at base, half as broad as 11th antennal segment Internal apical spur of anterior tibiae as long as 1st tarsal segment, internal spur of mesotibiae extending beyond the end of 2nd tarsal segment Posterior femora with distinct tooth at hind margin on distal part (Fig 1) in male Hind tibiae narrow, slightly and gradually dilated, distally narrower than anterior tibiae at their apex

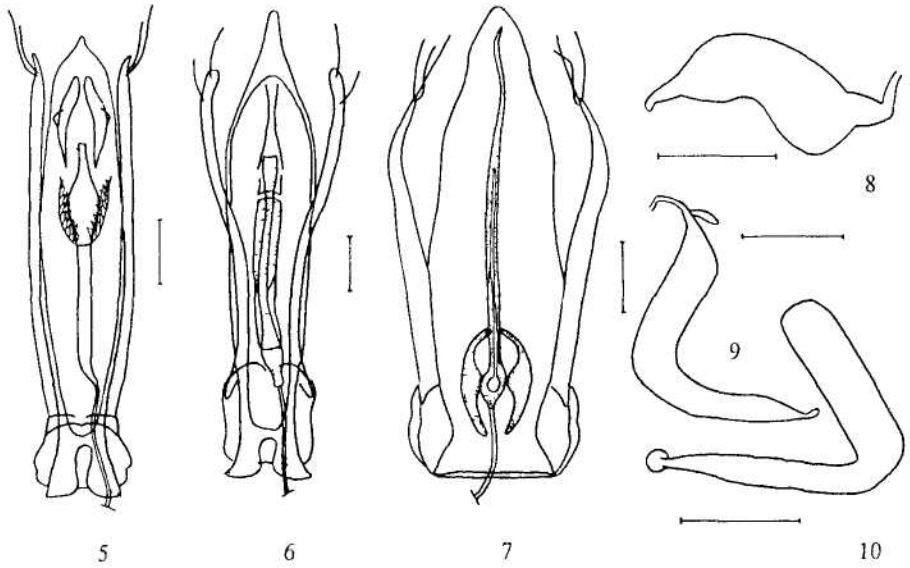
Genitalia Aedeagus as in Fig 4, spermatheca as in Fig 3



Figs 1 4 *Cyrtusa andreasi* sp n 1 hind leg of male 2 head 3 spermatheca 4 aedeagus dorsal view Scale = 0 1 mm

DERIVATIO NOMINIS It is derivated from the first name of Andreas Putz, one of the collectors

DIFFERENTIAL DIAGNOSIS *C andreasi* sp n can be compared to *C meghalayana* Daffner, 1985 by lacking elytral striae and by the wide antennal club Segments of antennal club except of the last one are twice as wide as long in *C meghalayana* while more than twice as broad as long in *C andreasi* The new species differs from *C meghalayana* by having an infuscate antennal club, by the shape of aedeagus and mainly by having the parameres much shorter than the tegmen while the parameres are longer than the tegmen in *C meghalayana*



Figs 5 10 *Pseudcolenis hilleri* Reitter 1884 (5 8) 5 aedeagus dorsal view 8 spermatheca *P strigosa* (Portevin 1905)(6 10) 6 aedeagus dorsal view 10 spermatheca *P sinica* Angelini et Svec 1995 (7 9) 7 aedeagus dorsal view 9 spermatheca Scale = 0 1 mm

Pseudoliodini Portevin, 1926

Two genera of the tribe are currently known from China They can be distinguished as follows

Mesosternum with distinct vertically arranged longitudinal carina head with short antennal grooves ventrally *Colenisia* Fauvel 1903

Mesosternum with bump or feeble obliquely arranged longitudinal carina head without antennal grooves ventrally *Pseudcolenis* Reitter 1884

Colenisia Fauvel, 1903

Only one species is known from China till now

Colenisia similata Angelini et Švec, 1994

Colenisia similata Angelini et Svec 1994 29

Material examined Female, China, Shaanxi, Quin Ling Shan 110 06 E 34 27 N Hua Shan Mts , N Valley 118km E Xian, 1 200 1 400 m 18 20 viii 1995, sifted, A Putz lgt, PC

Distribution Yunnan, new for Shaanxi

Pseudcolenis Reitter, 1884

The genus *Pseudcolenis* includes two subgenera – *Pseudcolenis* s str and *Pseudcolenisia* Daffner, 1988 Altogether 21 species were described or referred to the genus Nineteen of these were included in the revisionary paper by Daffner (1988), two further species were added later – *P sinica* Angelini et Švec, 1995 and *P boukali* Švec, 1996 Although not mentioned in their original descriptions, both of these species belong to subgenus *Pseudcolenis* s str A further 4 species new to science are added below, all of which belong to the subgenus *Pseudcolenis* s str

Subgenus *Pseudcolenisia* contains one species described from Papua New Guinea, *Pseudcolenis* s str contains the 24 remaining species including the 4 new ones described here The species of this subgenus can be separated into two distinctive groups stated here newly *Pseudcolenis* (*Pseudcolenis*) *bouvieri* species group and *P* (*P*) *hilleri* species group The diagnosis of the groups is given below in the key Further new species have been detected in material collected in Sulawesi They will be described later

Review of the groups and species of *Pseudcolenis* (*Pseudcolenis*)

species groups species	distribution
Pseudcolenis (*Pseudcolenis*) *bouvieri* group	
P bouvieri (Portevin 1903)	India
P laevipennis (Portevin 1922)	Indonesia (Java)
P laticornis sp n	China (Shaanxi)
P neglecta sp n	China (Sichuan, Yunnan)
Pseudcolenis (*Pseudcolenis*) *hilleri* group	
P aciculata Daffner 1988	India
P besucheti Daffner 1988	India
P boukali Svec, 1996	India
P dilatata sp n	China (Shaanxi Sichuan)
P disparilis Champion 1925	India, Nepal
P flavicollis Daffner 1988	India
P forticornis Daffner, 1988	Taiwan
P grandis (Portevin, 1905)	Japan, Russia (Far East)
P haemisphaerica (Champion, 1924)	India, Sri Lanka
P hilleri Reitter 1884	China (Fujian) Japan, Korea, Russia (Far East)
P indica (Portevin, 1926)	India
P klapperichi Daffner 1988	Taiwan
P loebli Daffner, 1988	India
P picea (Hisamatsu, 1964)	Japan, Taiwan
P rastrata (Champion 1923)	India
P rotundata Daffner, 1988	Vietnam
P shannae sp n	China (Shaanxi)
P sinica Angelini et Svec, 1995	China (Yunnan)
P strigosa (Portevin, 1905)	China (Shaanxi, Sichuan), India, Nepal, Thailand
P varicornis (Champion, 1924)	India

The subgenera of *Pseudcolenis*, the groups of species and Chinese species of the subgenus *Pseudcolenis* s str can be distinguished as follows

1 Mesosternum, viewed laterally with low narrow carina (*P. sedlaceki* Daffner 1988. Papua New Guinea) *Pseudcolenisia* Daffner 1988

– Mesosternum without carina. *Pseudcolenis* s. str. 2

2 (1) Elytra without transverse strigosites. *P. (P.) bouvieri* group 3

– Elytra with transverse strigosites. *P. (P.) hilleri* group 4

3 (2) Antennal club 6 segmented in male, 5 segmented in female. 6th antennal segment wider than long in female. Genitalia as in Figs 14, 21. Length of body 2.5–3.0 mm. China (Shaanxi) *P. laticornis* sp. n.

– Antennal club 5 segmented in both sexes. 6th antennal segment longer than wide in female. Genitalia as in Figs 11–13. Length of body 2.4–3.1 mm. China (Sichuan, Yunnan) *P. neglecta* sp. n.

4 (2) Rows of elytral punctures distinct. 7th antennal segment enlarged in male 5

– Rows of elytral punctures feeble, irregular and difficult to distinguish or completely missing. 7th antennal segment of usual shape in male 6

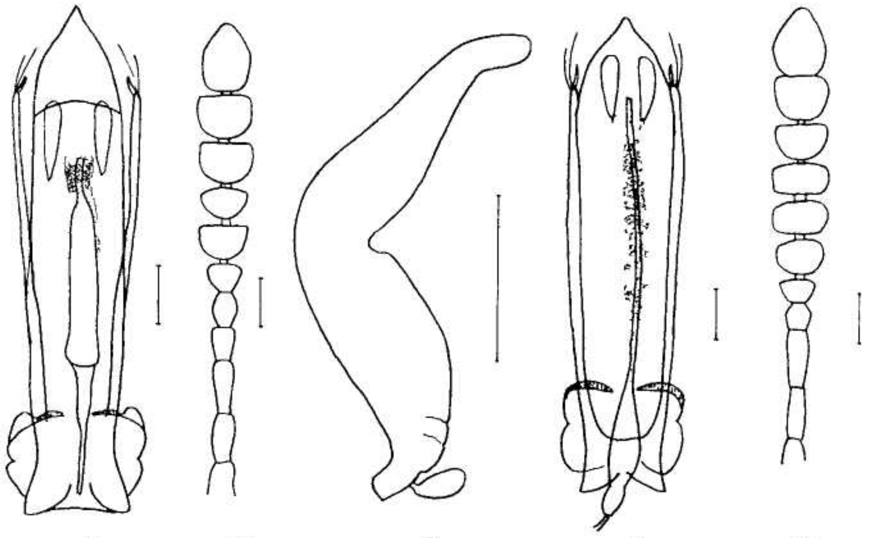
5 (4) Transverse elytral strigosites sparse, separated by at least 0.03–0.04mm. Elytral rows of punctures regular and distinct. Antennal club 5-segmented in both sexes. Genitalia as in Figs 19–23. Length of body 2.2–2.7 mm. China (Shaanxi) *P. shannae* sp. n.

– Strigosites on elytra extremely dense, separated by less than 0.01 mm. Elytra with irregular but distinct rows of punctures. Antennal club 6 segmented in male, 5 segmented in female. Genitalia as in Figs 16–22. Length of body 2.3–2.8 mm. China (Shaanxi, Sichuan) *P. dilatata* sp. n.

6 (4) Rows of elytral punctures feeble, irregular and difficult to distinguish. Aedeagus slender constricted before apex (genitalia as in Figs 7, 9). Elytral strigosites sparse, separated by at least 0.02 mm. Length of body 2.2–2.8 mm. China (Yunnan) *P. sinica* Angelini et Svec

– Elytra without rows of punctures. Elytral strigosites dense, separated at most by 0.015 mm 7

7 (6) Body short oval. Pronotal base slightly emarginate before hind angles. Antennal segments 1 to 6 usually yellow, remaining ones infuscate to dark. Genitalia as in Figs 5, 8. Length of body 1.7–2.1 mm. China (Fujian), Japan, Korea, Russia (Far East) *P. hilleri* Reitter



Figs 11–15. *Pseudcolenis neglecta* sp. n. (11–13): 11 – aedeagus, dorsal view, 12 – antenna of male, 13 – spermatheca. *P. laticornis* sp. n. (14–15): 14 – aedeagus, dorsal view, 15 – antenna of male. Scale = 0.1 mm.

Body oblong oval Pronotal base without emargination before hind angles Antennal segments 1 to 4 usually yellow, remaining ones infuscate to dark Genitalia as in Figs 6 10 Length of body 2 0 2 6 mm China (Shaanxi, Sichuan), India, Nepal, Thailand *P strigosa* (Portevin)

Pseudcolenis (*Pseudcolenis*) *bouvieri* group

Pseudcolenis bouvieri was recorded from China by Angelini et Švec, 1994 in error, the specimens upon which that diagnosis was made are in fact a new species, *P neglecta* sp n , described below

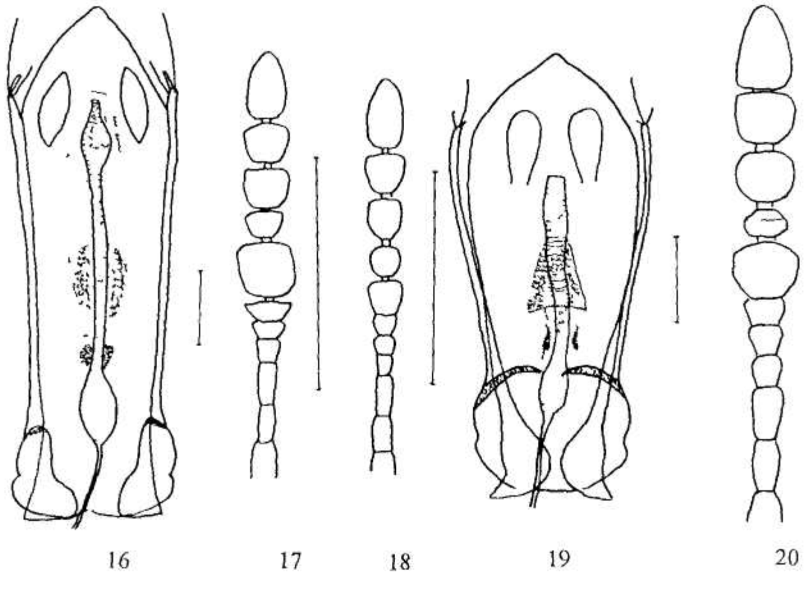
***Pseudcolenis* (*Pseudcolenis*) *laticornis* sp. n.**

(Figs 14, 15, 21)

TYPE MATERIAL Holotype, male, China Shaanxi, Quin Ling Shan, 33 45 N, 107 56 E, autoroute km 93 S of Zhouzhi 108 km SW Xian mountain forest, sifted 1650 m, 1 –2 ix 1995, A Putz lgt , paratypes, 8 males, 5 females the same locality and collector, holotype, 5 male and 4 female paratypes deposited in PC, the reminder in SC

DESCRIPTION Oval, yellow-brown with brown head except anterior part of clypeus which is lighter, with darker elytral suture and margins of scutellum, pronotum with brown disc, some paratypes entirely yellow brown except for being a little darker disc of pronotum and darker part of head near the eyes Legs, mouth-parts, antennal segments 1 to 5 or in some paratypes even to segment 4 or to segment 6 yellow, sometimes antennal club get turn from yellow to brown gradually Last antennal segment lighter than other claval segments or with lighter distal part Underside red yellow

Length of body 2 5–3 0 mm, in holotype 2 8 mm, head 0 3 mm, pronotum 0 8 mm, elytra 1 7 mm, antenna 1 0 mm Maximum width of head in holotype 0 8 mm, pronotum 1 5 mm at base, elytra 1 5 mm at base, 1 6 mm at basal third



Figs 16-20 *Pseudcolenis dilatata* sp n (16 – 18) 16 – aedeagus, dorsal view 17 – antenna of male 18 – antenna of female *P shannae* sp n (19 20) Fig 19 – aedeagus, dorsal view, 20 – antenna of male Scale = 0 1 mm

Head Anterior part of clypeus, in some paratypes only narrow strip along the anterior margin obsolete densely strigose, temples distinctly transversely strigose Clypeal line fine, but distinctly developed in some examples briefly and irregularly interrupted in places Very irregularly but distinctly punctate, punctures separated by about 2–5 times their own diameter Some larger punctures irregularly interposed Antennal club 6-segmented in male (Fig 15), antennal segments gradually enlarged but apparently 5-segmented in female Ratio of length of antennal segments 2 to 11 (the 2nd equal to 1 0) = 1 0–1 0–0 6–0 7–0 8–0 9–0 8–0 9–0 8–1 3 Ratio of width of club segments 6 to 11 (6th equal to 1 0) 1 0–1 1–1 1–1 0 1 0–0 8 Ratio of width length of the antennal club segments 1 5–1 4–1 6–1 3–1 5–0 8 Measurements taken from holotype Antennal segments 8 9 and 10 wider than long, 7 and 11 narrower than long in females Ratios mentioned not quite constant In some paratypes all antennal segments 7 to 10 are wider than long

Pronotum Widest at base, lateral margins roundly narrowed anteriorly Hind angles blunt, closely rounded in dorsal view In lateral view hind angles slightly blunt, closely rounded, lateral margins rounded Base straight, before hind angles oblique Without microreticulation Irregular scattered puncturation, puctures finer than those on head, separated by about 2–7 times their diameter A few larger punctures at sides before base

Scutellum Without microsculpture

Elytra Sides rounded, widest at basal third Lateral sides of elytra visible throughout whole length from shoulders to apex Without microreticulation or strigosity With distinct regular striae reaching base formed by strong punctures separated by about 1–3 times their own diameter Toward apex and sides punctures become smaller and scarcer Elytral rows before base less regular and rather confused in some paratypes Interstices punctate, punctures separated by about 2–4 times their own diameter arranged in less regular rows Sutural stria deep, extending from apex to basal seventh of elytral length from where it continues as a row of punctures

Metasternum Microreticulate without punctures

Ventrites Without striking characters

Metathoracic wings fully developed

Legs First four segments at anterior tarsi very slightly dilated, 1st elongate, as long as 2nd and 3rd together in male Tarsi simple and slender in female

Genitalia Aedeagus as in Fig 14, spermatheca as in Fig 21

DERIVATIO NOMINIS The name selected draws attention to the wide antennal club

DIFFERENTIAL DIAGNOSIS *P laticornis* sp n is similar to *P neglecta* sp n and *P bouvieri* in lacking elytral strigosity, having punctured striae present on elytra and by the shape of aedeagus Aedeagus in *P bouvieri* is figured by Daffner (1988 159, figs 16, 17) The new species differs in possessing a 6-segmented club in the male, it is 5-segmented in both sexes in the species compared The 6th antennal segment is transverse in females of *P laticornis* sp n , in the species being compared it is enlongate Also the shape of endophallus is different in all species mentioned

Pseudcolenis (*Pseudcolenis*) *neglecta* sp. n.
(Figs 11–13)

Pseudcolenis bouvieri Angelini et Svec 1994 29

TYPE MATERIAL Holotype male China Yunnan Heishui 27 13 N 100 19 E 35 km N of Lijiang 1 19 vii 1992 S Becvar lgt paratypes 1 female same locality and collector 1 female China Sichuan Liziping pr Shimian 200 km SW from Yaan 27 vi 3 vii 1991 Z Kejval lgt all deposited in SC 2 females China W Sichuan Daxue Shan Hailuogou Glacier Park Camp I 2100 m 29 36 00 N 102 03 35 E 27 31 v 1997 M Schulke lgt 1 paratype SCHC 1 paratype SC 3 females China W Sichuan Daxue Shan Gongga Shan Mtn Hailuogou Glacier Park Camp I 2100 m 29 36 N 102 04 E 28 31 v 1997 A Putz lgt 2 paratypes PC 1 paratype SC

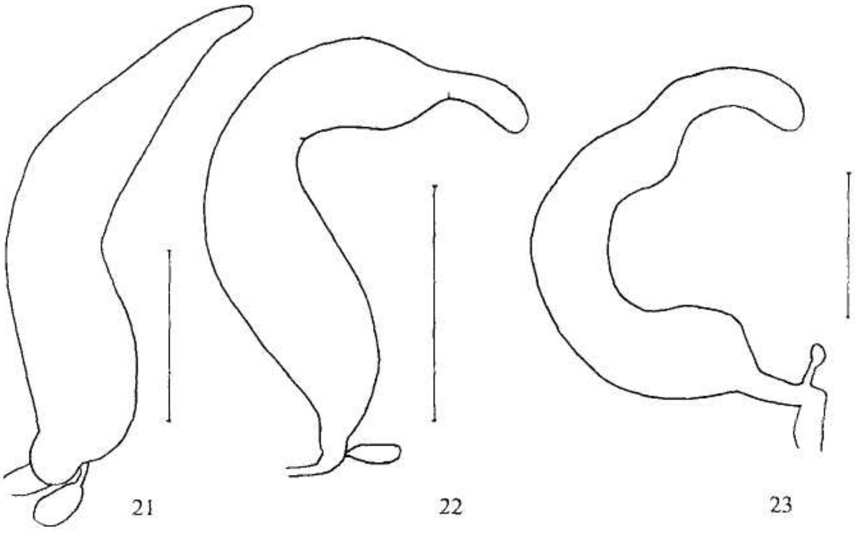
Description Short oval, yellow-brown, head brown except anterior part of clypeus and longitudinal spot on front and vertex which are lighter, pronotum with brown disc, margins of scutellum and elytral suture brown One of the paratypes entirely red brown Legs brown-yellow, mouth parts antennal segments 1 to 6 yellow, antennal club brown except for lighter colored proximal two-thirds to half of last antennal segment Last antennal segment entirely yellow in two of the paratypes Underside red-brown

Length 2 6–3 1 mm, in holotype 2 9 mm, head 0 3 mm, pronotum 0 7 mm, elytra 1 9 mm, antenna 0 9 mm Maximal width of head 0 8 mm, pronotum 1 5 mm at base, elytra 1 6 mm at base, 1 7 mm at basal third

Head Clypeus frons and temples finely transversely strigose, the strigosity covers the whole head in one of the paratypes Clypeal line distinct With very irregularly spaced but distinct fine punctures separated by about 3–5 times their own diameter Some larger punctures placed behind the clypeal line and in an irregular tranverse row behind hind level of eyes Antennal club 5 segmented (Fig 12) Ratio of length of antennal segments 2 to 11 (the 2nd equal to 1 0) = 1 0–1 0 0 6–0 6–0 6–0 8–0 6–0 8–0 9–1 4 Ratio of width of club segments 7 to 11 (7th equal to 1 0) 1 0–0 9 1 0–1 2–1 1 Ratio of width length of the antennal club segments 1 2 1 3–1 2–1 3–0 7 Measurement taken from holotype Antennal segments 8, 9 and 10 wider than long, 7th and 11th as wide as long in females

Pronotum Widest at base, lateral margins curved, narrowed anteriory Hind angles sharp tightly rounded in dorsal view In lateral view hind slightly blunt angles nearly pointed, lateral margins rounded Base straight, oblique before hind angles Without microreticulation Irregularly punctate puctures as fine as those on head separated by about 2–7 times their own diameter Some very sparse smaller and larger punctures interspersed

Scutellum Without microreticulation, with several punctures larger than those on pronotum



Figs 21 23 21 *Pseudcolenis laticornis* sp n spermatheca 22 – *P dilatata* sp n, spermatheca 23 *P shannae* sp n spermatheca Scale = 0 1 mm

Elytra Sides rounded, widest at basal third Lateral margins of elytra visible from shoulders to apex Without microreticulation, without strigosity With distinct, sometimes less regular rows of punctures reaching base Elytral rows formed of strong punctures separated by about 1 5–2 0 times their own diameter Interstices with punctures spaced by about 2–3 times their own diameter tending to form rows Sutural stria deep reaching from apex to basal third of elytral, then continuing as row of punctures

Metasternum With some shallow punctures bearing yellow setae at sides

Ventrites Without striking characters

Metathoracic wings fully developed

Legs 1st segment at anterior tarsi dilated, elongated, as long as 2nd and 3rd together in male Tarsi simple and slender in female

Genitalia Aedeagus as in Fig 11, spermatheca as in Fig 13

Derivatio nominis The name testifies to the neglect in previously recognising this as a new species in an earlier paper (Angelini & Švec 1994) this species was confounded with *P bouvieri*

Differential diagnosis *P neglecta* sp n is very similar to *P bouvieri* by the absence of elytral strigosity, punctured striae present on elytra and by the shape of aedeagus It differs in having the 8th antennal segment transverse From *P laticornis* sp n , belonging to the same group of species, *P neglecta* sp n differs in having a 5-segmented antennal club in the male, the club is 6-segmented in the male of the species compared Also the shape of the endophallus is different in all species mentioned

Pseudcolenis (*Pseudcolenis*) *hilleri* group

***Pseudcolenis* (*Pseudcolenis*) *dilatata* sp. n.**

(Figs 16–18, 22)

Type material Holotype male China Shaanxi Quin Ling Shan 33 45 N 107 56 E autoroute km 93 S of Zhouzhi 108 km SW Xian mountain forest sifted 1650 m 1 2 ix 1995 A Putz lgt paratypes 18 males 23 females the same locality and collector holotype and 13 male paratypes as well as 17 female paratypes deposited in PC 5 male and 6 female paratypes in SC 3 males 2 females China Sichuan Daxue Shan Mt Hailuogou Glacier Park 29 36 N 102 04 E river valley ca 1 km above Camp I 2100 m 28 31 v 1997 A Putz lgt 2 male 2 female paratypes deposited in PC 1 male paratype in SC 1 female China W Sichuan Daxue Shan Hailuogou Glacier Park Camp I 29 36 00 N 102 03 35 E 2100 m 27–31 v 1997 M Schulke lgt deposited in SCHC

Description Short oval, yellow-brown or red-brown to dark brown, in some paratypes head and elytra dark red-brown, pronotum red or red with disc darker Clypeus, in dark examples also margin of pronotum and elytra as well as legs and mouth-parts reddish, 1st to 6th antennal segments yellow, 7th to 10th dark yellow-brown to dark brown Underside brown-yellow

Length 2 3–2 8 mm, in holotype 2 8 mm, head 0 3 mm, pronotum 0 7 mm, elytra 1 8 mm, antenna 0 9 mm Maximum width of head 0 8 mm, pronotum 1 6 mm at base, elytra 1 7 mm at base

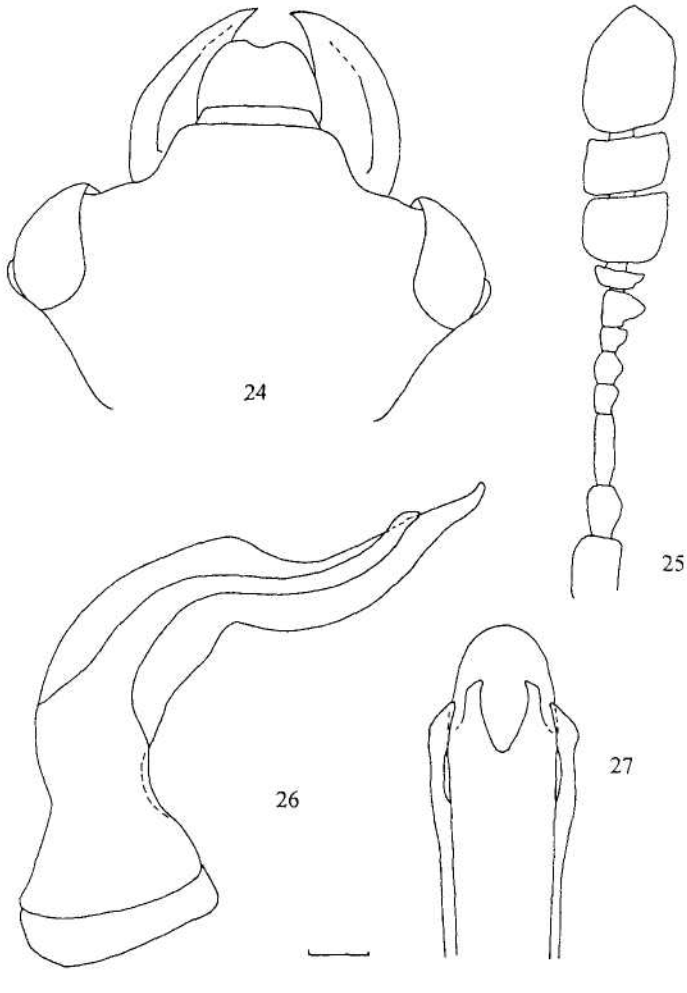
Head Wholly covered with fine dense transverse strigosity Strigosites more than twice as dense as those on elytra With distinct fine punctures each separated by about 2–4 times their own diameter toward eyes punctuation sparser Four larger punctures forming an irregular transverse row behind hind level of eyes Clypeal line superficial

Antennal club 6 segmented in male (Fig 17), 5-segmented in female (Fig 18) Ratio of length of antennal segments 2 to 11 (the 2nd equal to 1 0) 1 0–0 9–0 5–0 4–0 5–1 2–0 8–1 0 0 9 1 5 Ratio of width of club segments 6 to 11 (6th equal to 1 0) 1 0–1 4–0 9–0 9–0 9–0 8 Ratio of width length of the antennal club segments 2 3–1 3–1 2–1 0–1 1–0 6 Measurement taken from holotype In females usually antennal segments 7 and 8 transverse, 9 elongate, 10 quadrate and 11 twice as long as wide

Pronotum. Widest at base, lateral margins curved, narrowed anteriory. Hind angles sharp, very abruptly rounded, viewed dorsally, nearly pointed. In lateral view hind angles rectangular, very tightly rounded, lateral margins straight from hind angles to middle, then curved toward the anterior angles. Base straight, laterally weakly emarginate, oblique before the hind angles. Strigosity as on head. Very finely and sparsely punctate, punctures small separated by about 4–7 times their own diameter. A small number of larger punctures interspersed.

Scutellum. Strigosity as on head.

Elytra. Widest at shoulders, toward apex roundly narrowed. Lateral margins of elytra visible from shoulders to apex. With distinct, dense transverse strigosity twice as wide as those on head, pronotum and scutellum. Punctures distinct, on disc arranged in traces of irregular rows, separated by



Figs 24–27. *Cyrtoplastus schuelkei* sp. n. 24 – head, 25 – antenna, 26 – aedeagus, lateral view, 27 – aedeagus, ventral view. Scale = 0.1 mm

about 1–2 times their own diameter Sutural stria long, deep reaching from apex to basal tenth of elytral length

Metasternum With some large shallow punctures at sides, central part with recumbent yellow setae

Ventrites Without striking characters

Metathoracic wings fully developed

Legs First four segments of anterior tarsi slightly dilated, 1st elongate, shorter than 2nd and 3rd together in male Tarsi simple and slim in female

Genitalia Aedeagus as in Fig 16, internal siphon straight or sinuate Spermatheca as in Fig 22

DERIVATIO NOMINIS The name is derivated from the extremely dilated 7th antennal segment

DIFFERENTIAL DIAGNOSIS *P dilatata* sp n is morphologicaly very close to *P besucheti* and *P aciculata* in possessing very densely strigose elytra and in lacking distinct striae, broad-oval shape of body and by the enlarged 7th antennal segment in male The new species differs from *P besucheti* clearly by the shape of the tegmen which is broadest at about the apical third, while the tegmen in *P besucheti* is distinctly narrower at the apical third than at the middle Tip of the tegmen possesses a small short rounded bump in the new species, tip of tegmen is pointed in *P besucheti* The aedeagus of *P aciculata* is very similar to that of *P dilatata* sp n but the endophallus is of different shape in both species

***Pseudcolenis* (*Pseudcolenis*) *strigosa* (Portevin, 1905)**

(Figs 6, 10)

Liodinella strigosa Portevin 1905 423

MATERIAL EXAMINED 3 specimens China Sichuan Daxue Shan Gongga Shan Mts Hailuogou Glacier Park 29 36 N 102 04 E river valley ca 1 km above Camp I 2100 m 28 31 v 1997 A Putz lgt 1 spec Sichuan Daxue Shan Gongga Shan Mts Hailuogou Glacier Park above Camp III 3000 m 30 v 1997 A Putz lgt 1 spec China Shaanxi Quin Ling Shan 33 45 N 107 56 N autoroute km 93 S of Zhouzhi 108 km SW Xian mountain forest sifted 1650 m 1 2 ix 1995 A Putz lgt All PC

Distribution Nepal, India, Thailand, new to China (Shaanxi, Sichuan)

***Pseudcolenis* (*Pseudcolenis*) *shannae* sp. n.**

(Figs 19, 20, 23)

TYPE MATERIAL Holotype male China Shaanxi Quin Ling Shan 33 45 N 107 56 E autoroute km 93 S of Zhouzhi 108 km SW Xian mountain forest sifted 1650 m 1 2 ix 1995 A Putz lgt paratypes 2 males 2 females the same locality and collector holotype and 1 male and 1 female paratype deposited in PC 1 male 1 female paratypes in SC 1 male China Shaanxi Quin Ling Shan 34 27 31 N 110 05 00 E Hua Shan Mt 118 E Xian way to first top 600 1600m sifted 17 21 viii 1995 M Schulke lgt deposited in SCHC

DESCRIPTION Short oval, castaneous to dark brown Clypeus, margins of pronotum, in some paratypes only the lateral margins, and apex of elytra yellow-brown or red-brown Legs, mouth-parts and 1st to 6th antennal segments yellow red, 7 to 10 brown to dark brown Basal half of 11th segment dark, distal half lighter, antennae entirely light in one of the paratypes Underside yellow brown

Length 2 2–2 7 mm, in holotype 2 2 mm, head 0 3 mm, pronotum 0 6 mm, elytra 1 3 mm, antenna 0 8 mm Maximum width of head in holotype 0 6 mm, pronotum 1 3 mm at base, elytra 1 4 mm just behind base

Head Entirely covered with fine dense transverse elongate microreticulation With distinct small punctures separated by about 2–5 times their own diameter Two pairs of larger punctures forming an irregular transverse row placed at hind level of eyes Behind the superficial clypeal line transverse depression in some paratypes reduced to two small depressions at the sides of clypeus

Antennal club 5 segmented in both sexes, 7th antennal segment enlarged in male Antenna of male as in Fig 20 Ratio of length of antennal segments 2 to 11 (the 2nd equal to 1 0) 1 0 1 1–0 5 0 4 0 5 1 0–0 5–0 8 0 8–1 6 Ratio of width of club segments 7 to 11 (7th equal to 1 0) 1 0 0 6–0 7 0 9 0 8 Ratio of width length of the antennal club segments 1 2 1 3–1 0–1 2–0 6 Measurements taken from holotype In females usually antennal segments 8, 9 and 10 wider than long 7 as wide as long and 11 nearly twice as long as wide Ratios mentioned above not allways constant

Pronotum Widest at base, lateral margins curved, narrowed anteriory Hind angles sharp, abruptly rounded In lateral view hind angles rectangular very abruptly rounded, lateral margins straight narrowed toward anterior angles Base straight, laterally weakly emarginate in male Emargination very slight or absent in females Microsculpture finer than on head Punctures finer and sparser than on head and irregularly spaced, separated by about 5 10 times their own diameter A few larger punctures interposed

Scutellum Microsculptured as on head

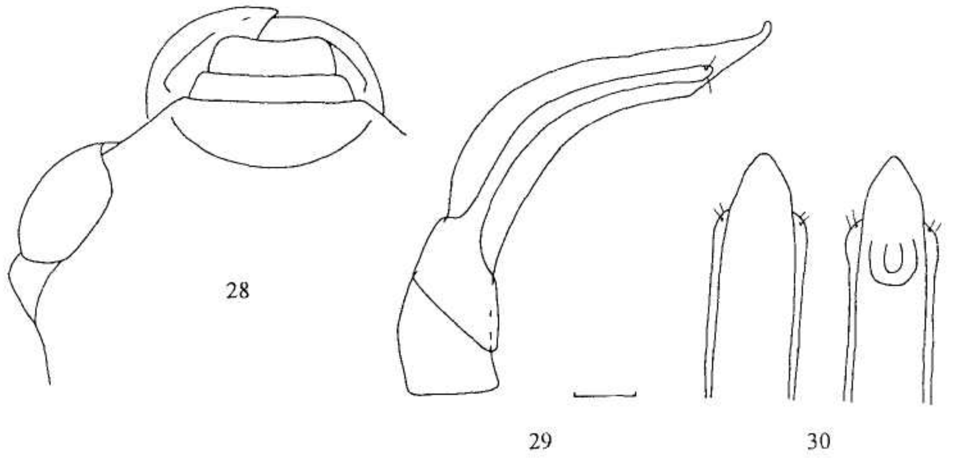
Elytra Widest at shoulders, nearly parallel sided in the basal third then curved toward apex Lateral margins of elytra visible from shoulders to apex With distinct, sparse transverse strigosites about 0 03–0 04 mm wide Punctuation distinct, arranged in rows, each separated by about 2–4 times their own diameter, connected by strigosites Intervals with smaller punctures with the tendency to form rows Sutural stria deep, reaching from apex to basal quarter, then continuing as row of punctures

Metasternum Without distinct punctures, central part with recumbent yellow setae

Ventrites Without striking characters

Metathoracic wings fully developed

Legs First four segments of anterior tarsi very slightly dilated, 1st elongate, as long as 2nd and 3rd together in male Tarsi simple and slim in female



Figs 28 30 *Agathidium* (*Neoceble*) *daxuense* sp n 28 head 29 aedeagus lateral view 30 aedeagus dorsal and ventral views Scale = 0 1mm

Genitalia Aedeagus as in Fig 19, spermatheca as in Fig 23

DERIVATIO NOMINIS Dedicated to the wife of one of the collectors, Madame Shanna Nikolaevna Putz

DIFFERENTIAL DIAGNOSIS *P shannae* sp n differs from the other species of the group in the combination of three characters possessing sparse elytral strigosity, by the enlarged 7th antennal segment in male and by the shape of aedeagus resembling that of *P aciculata* (Daffner 1988 176, figs 58, 59)

Agathidiini Westwood, 1838

Four genera comprising 68 species were known from China till now A further 6 new species are described below The genera can be keyed as follows

1	Antennal club 5 segmented	*Anisotoma* Panzer 1797
	Antennal club 3 segmented	2
2 (1)	Clypeus protuberant	*Cyrtoplastus* Reitter 1884
	Clypeus not protuberant	3
3 (2)	Clypeus not emarginate	*Stetholiodes* Fall 1910
	Clypeus emarginate	*Agathidium* Panzer 1797

Anisotoma Panzer, 1797

Altogether eigth species of the genus are known from China (Angelini & Cooter, 1999)

Anisotoma krali Angelini et Švec, 1994

Anisotoma krali Angelini et Svec 1994 3

MATERIAL EXAMINED 1 male 1 female China Sichuan Gongga Shan Hailuogou above Camp 3 3 050 m, 8 vii 1996 29 35 N 102 00 E J Farkac P Kabatek A Smetana lgt deposited in SC

DISTRIBUTION China (Yunnan, new record for Sichuan)

Cyrtoplastus Reitter, 1884

Three species of the genus are known from China (Angelini & Cooter, 1999)

Cyrtoplastus schuelkei sp. n.

(Figs 24–27)

TYPE MATERIAL Holotype male China Sichuan Qingcheng Shan Ruckseite 650 700 m 30 53 56 N 103 33 01 E 18 v 1997 leg and coll Schulke paratypes 1 male the same locality and collectors deposited in SCHC 1 male Sichuan Qingcheng Shan 65 Km NW Chengdu 8 km W Taiping 800–1000 m 30 53 N 103 33 E 18 v/3 4 vi 1997 A Putz lgt deposited in AC

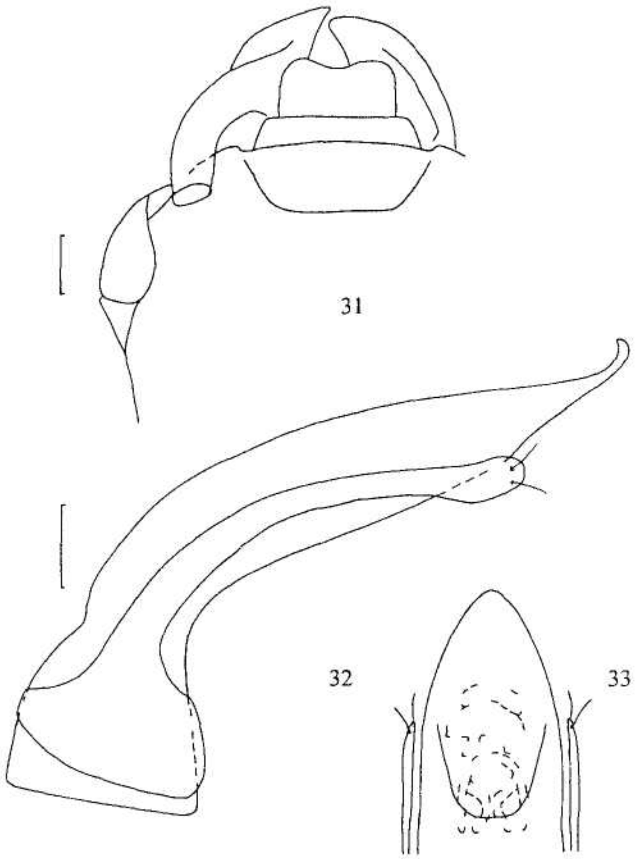
DESCRIPTION Whole dorsum black, mesosternum reddish-brown, metasternum black, antennae testaceous with dark antennal club, legs reddish-brown Microreticulation absent on whole dorsum, puncturation distinct and double on head and pronotum, each elytron with 8 rows of punctures Sutural striae clear and well defined, ending abruptly and confined within the apical fourth of the elytra

Length 3 0–3 2 mm, in holotype 3 1 mm, head 0 7 mm, pronotum 0 7 mm, elytra 1 7 mm, width of head 0 9 mm, pronotum 1 6 mm, elytra 1 8 mm, height of pronotum 0 6 mm, elytra 1 2 mm

Pronotum, width/length = 2 06 width/height – 2 58 Elytra, width/length – 1 03, width/height – 1 45

Head Puncturation double, principle punctures moderately large and moderately impressed separated from each other by 0 5–2 times their own diameter, secondary punctures very small and superficial, separated by 2–8 times their own diameter, puncturation simple on clypeus, punctures as small and superficial as the secondary punctures Antero-lateral margins rounded, uniform, terminating in a small depression either side of the clypeus Cypeus protuberant Clypeal line superficial Eyes protuberant Head widest at eyes (Fig 24) Antennae with 3rd segment 1 4 times as long as the 2nd and longer than 4th+5th together (Fig 25)

Pronotum Puncturation as on the head but with the principle punctures a little more scattered, separated by 1–8 times their own diameter and slightly more superficially impressed, secondary punctures very small and superficial, separated by 2–10 times their own diameter Pronotum 1 82 times as broad as head, much broader than long and slightly convex Anterior margin sharply curved, lateral outline with subparallel sides



Figs 31–33 *Agathidium (Neoceble) shaanxiense* sp n 31 head 32 aedeagus lateral view 33 aedeagus ventral view Scale – 0 1 mm

Elytra. The 8 striae composed of large clear punctures, separated by 0.5–1 times their diameter, punctures in interstices very small and superficial, hardly visible, separated by 2–10 times their diameter. Distinctly broader than the pronotum and slightly broader than long, very convex. Lateral outline with sharp humeral angle.

Meso- and metastenum. Median carina absent, lateral lines complete, femoral lines absent.

Metathoracic wings present.

Legs. Tarsal formula in male 5–5–4, in female not known.

Aedeagus as in Figs 26, 27.

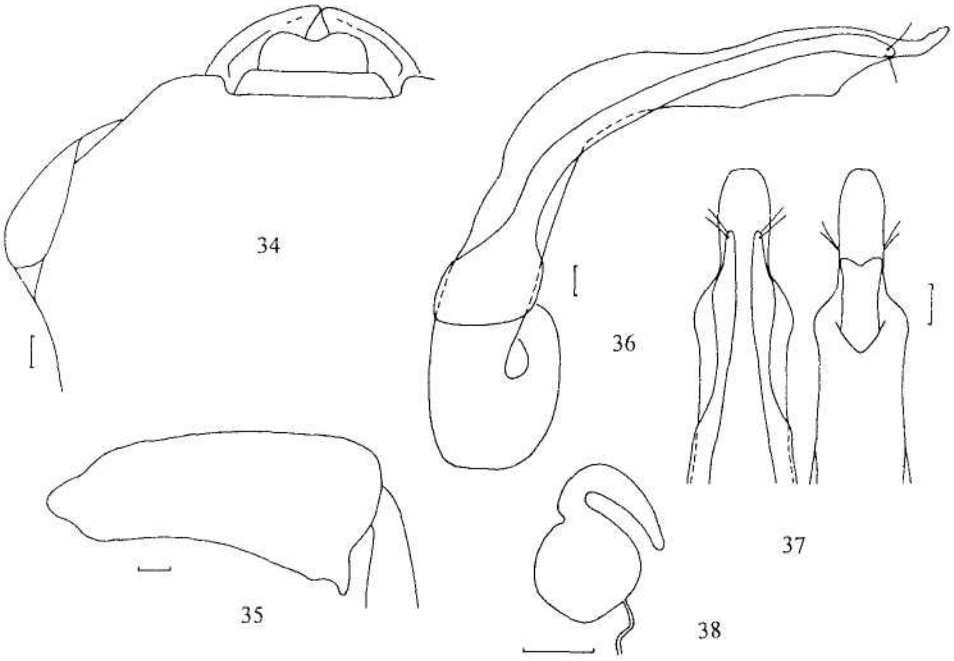
DERIVATIO NOMINIS. Dedicated to M. Schülke, captor of the species.

DIFFERENTIAL DIAGNOSIS. *Cyrtoplastus schuelkei* sp. n. is very similar to *Cyrtoplastus tianmuensis* Angelini et Cooter, 1998 and *C. chinensis* Angelini et Švec, 1994. It differs in having the dorsum uniformly black, in the shape of the aedeagus and in the greater length ratio 3rd/2nd antennal segments; from *chinensis* it differs also in colouring of antennae.

Agathidium Panzer, 1797

Alltogether 54 species of the genus are currently known from China (Angelini & Cooter, 1999; Angelini, 1999). A further five species new to science are described here.

Eight subgenera of the genus *Agathidium* were described till now. Four of them are known from China (Angelini & Cooter 1999): *Neoceble* Gozis, 1886 (7 species), *Agathidium* s. str. Panzer, 1797



Figs 34–38. *Agathidium (Agathidium) giganteum* sp. n. 34 – head, 35 – male hind femur, 36 – aedeagus, lateral view, 37 – aedeagus, dorsal and ventral views, 38 – spermatheca. Scale = 0.1 mm

(41 species) *Microceble* Angelini et De Marzo, 1986 (9 species) *Macroceble* Angelini, 1993 (2 species) The subgenera can be keyed as follows

1 Lateral outline of elytra with distinct closely rounded humeral angle 2
Lateral outline of elytra with week very broadly rounded humeral angle 4
2 (1) Temples well developed as long as 1/3 1/2 of eyes length Subgenus *Cyphoceble* Thomson 1859
Temples absent or if present shorter than 1/3 of eyes length 3
3 (2) Each elytron with 2 6 rows of large punctures Subgenus *Rhabdochytrum* Hlisnikovsky 1964
Elytra without rows of large punctures Subgenus *Neoceble* Gozis 1886
4 (1) Metasternum not abbreviated femoral lines distinctly developed 5
Metasternum strongly abbreviated femoral lines absent or indistinct 7
5 (4) Eyes flattened or moderately convex not haemisphaerical Clypeus without or with impressed clypeal line Subgenus *Agathidium* s str Panzer 1797
Eyes haemispherical Clypeus with raised clypeal carina or with lateral grooves 6
6 (5) Head small (width ratio of pronotum head – 1 7 2 1) Subgenus *Microceble* Angelini et De Marzo 1986
Head large (width ratio of pronotum head = at most 1 6) Subgenus *Euryceble* Hlisnikovsky 1964
7 (4) Meso and metacoxae well separated Subgenus *Chaetoceble* Deville 1899
Meso and metacoxae approached Subgenus *Macroceble* Angelini 1992

The species described or recorded below are sorted according to the species groups stated by Angelini (1993) The main features typical for the species groups are added in brackets

Subgenus *Neoceble* Gozis, 1886

Agathidium (*Neoceble*) *varians* group
(Elytra with sutural striae, dorsum microreticulate)

Agathidium (*Neoceble*) *daxuense* sp. n.
(Figs 28 30)

TYPE MATERIAL Holotype male China W Sichuan Daxue Shan Hailuogou Glacier Park (Gongga Shan) tongue of glacier I 3200 m 29 34 N/102 00 E 29 v 1997 Wrase lgt deposited in PC

DESCRIPTION Dorsal surface of head black, pronotum dark reddish-brown with sides lighter, elytra dark reddish brown mesosternun reddish brown, metasternum black, antennae testaceous with club dark legs reddish brown Microreticulation clear on head, superficial on pronotum, present only in traces on elytra, head impunctate, sparse puncturation on pronotum, elytra clearly punctate Sutural striae clearly impressed, extending from apex to middle of elytra

Length 2 7 mm head 0 5 mm pronotum 0 7 mm, elytra 1 5 mm Maximum width of head in holotype 0 9 mm pronotum 1 3 mm, elytra 1 3 mm Height of pronotum in holotype 0 7 mm elytra 0 9 mm Pronotum, width/length = 1 82, width/height – 1 96 Elytra width/length – 0 89, width/height = 1 38

Head Microreticulation very strong, dorsum dull, puncturation absent Widest just behind eyes temple very short (Fig 28) antero-lateral margins uniform, small depression either side of the clypeus clypeus weakly excavate, clypeal line clearly impressed, eyes protuberant 3rd antennal segment 1 15 times as long as the 2nd and shorter than 4th+5th together

Pronotum Microreticulation very superficial, poorly visible, punctures small and superficial, separated from each other by 3–6 times their own diameter, with a few small superficial secondary punctures interspersed Pronotum 1 5 times as broad as head, much broader than long and slightly convex anterior margin weakly curved, lateral outline broadly curved posteriorly, sharply curved anteriorly, sides subparallel

Elytra Microreticulation present only in vague traces, punctures larger, and more clearly impressed separated from each other by 0 5 1 times their own diameter Just a little broader than pronotum, moderately longer than broad and very convex, lateral outline with sharp humeral angle

Meso- and metasternum Median carina distinct, lateral lines complete, femoral lines absent

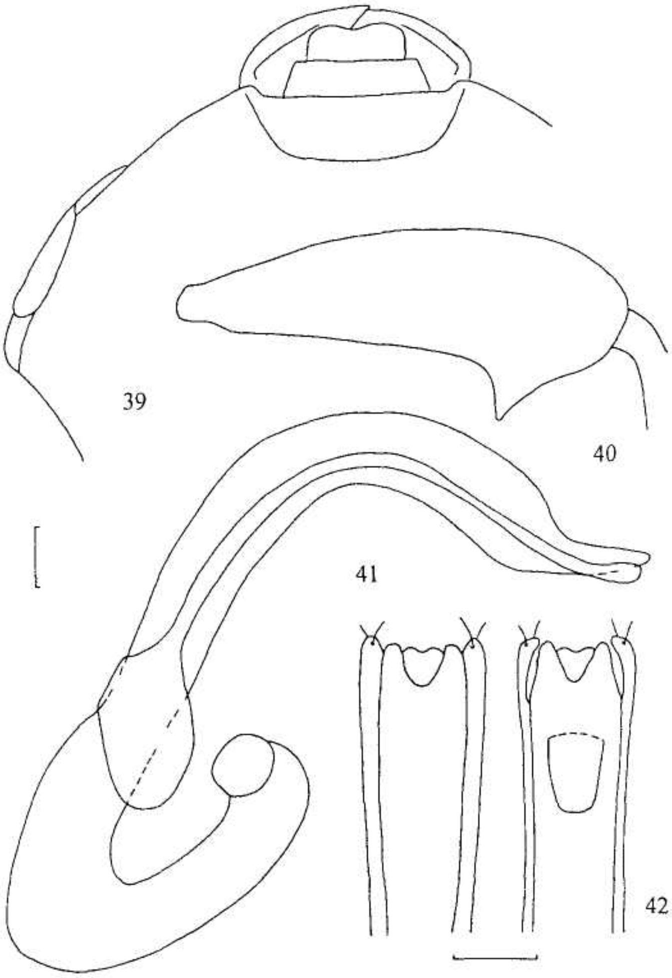
Metathoracic wings absent

Legs Tarsal formula 5–5–4 in male, female unknown First three tarsal segments slightly dilated in male

Genitalia Aedeagus as in Figs 29, 30

DERIVATIO NOMINIS Derivated from the name of the mountains of original occurence

DIFFERENTIAL DIAGNOSIS *Agathidium daxuense* sp n differs from *A dundai* Angelini et Švec, 1994 (also of the *A* (*N*) *varians* species group) in presence of microreticulation on head and pronotum



Figs 39–42 *Agathidium* (*Agathidium*) *janatai* sp n 39 head 40 male hind femur 41 aedeagus lateral view 42 aedeagus dorsal and ventral view Scale = 0 1 mm

Agathidium (*Neoceble*) *nigripenne* group
(Elytra with sutural striae, dorsum not microreticulate)

***Agathidium* (*Neoceble*) *shaanxiense* sp. n.**
(Figs 31–33)

TYPE MATERIAL Holotype male China Shaanxi Qin Ling Shan 110 06 E 34 25 N Hun Shan Mt S top 1950 2000 m forest sifted 19 viii 1995 A Putz lgt deposited in PC

DESCRIPTION Dorsum of head and pronotum reddish-brown, elytra black, mesosternum testaceous, metasternum reddish-brown, antennae testaceous with club dark, legs reddish-brown Microreticulation absent, puncturation clear and double on the whole dorsum Sutural striae clearly impressed, extending from apex to middle of elytra

Length 2 8 mm, head 0 6 mm, pronotum 0 8 mm, elytra 1 4 mm Maximal width of head in holotype 0 9 mm, pronotum 1 3 mm, elytra 1 4 mm Height of pronotum 0 7 mm, elytra 1 0 mm Pronotum, width/lenght = 1 70, width/height = 1 77 Elytra, width/length = 1 4, width/height = 1 0

Head Punctures large and clearly impressed, separated from each other by 1–2 times their own diameter, secondary punctures small, superficial, separated from each other by 1–6 times their own diameter Widest just behind eyes temple long 1/10 of eyes length (Fig 31), antero-lateral margins uniform, clypeus weakly emarginate, clypeal line very superficial, hardly visible, left mandible (of male) with sharp tooth, eyes protuberant 3rd antennal segment 1 7 times as long as the 2nd and shorter than 4th+5th

Pronotum Punctures smaller and more superficial than those of head, separated from each other by 2–4 times their own diameter, secondary punctures small, superficial, separated from each other by 2–10 times their own diameter Pronotum 1 47 times as broad as head, moderately broader than long and moderately convex, anterior margin weakly curved, lateral outline broadly curved posteriorly, sharply curved anteriorly

Elytra Punctures larger than those of the pronotum, separated from each other by 4–6 times their own diameter, with a few even smaller punctures and traces of microscopic wrinkles are interposed Slightly broader than pronotum, as broad as long and very convex, lateral outline with sharp humeral angle

Meso and metasternum median carina weak, lateral lines complete, femoral lines absent

Metathoracic wings present

Legs Tarsal formula 5–5–4 in male, female unknown

Genitalia Aedeagus as in Figs 32, 33

DERIVATIO NOMINIS After Shaanxi Province where the species was discovered

DIFFERENTIAL DIAGNOSIS *Agathidium shaanxiense* sp n differs from *A unicolorum* Angelini et De Marzo, 1984 in the colouring of antennal club, greater length ratio 3rd/2nd antennal segments, denser puncturation of dorsum and by having the clypeal line less superficially impressed

Subgenus *Agathidium* s. str. Panzer, 1797

Agathidium (*Agathidium*) *madurense* group
(Anterior margin of head raised)

***Agathidium* (*Agathidium*) *giganteum* sp. n.**
(Figs 34–38)

TYPE MATERIAL Holotype male China W Sichuan, Daxue Shan, Hailuogou Glacier Park (Gongga Shan) Camp 1 2100 m 29 36 N/102 04 E 27–28 V 1997, Wrase lgt deposited in PC paratype 1 male same data as holotype deposited in AC

DESCRIPTION Dorsum uniformly black, mesosternum dark reddish-brown, metasternum even darker or black, antennae uniformly testaceous, legs reddish brown Microreticulation only in vague traces on elytra as long and irregular furrows, otherwise totally absent, puncturation fine and sparse on head and pronotum, microscopic on elytra Sutural striae absent

Length 5 5–6 5 mm, 6 5 mm in holotype Length of head in holotype 1 3 mm, pronotum 2 4 mm, elytra 2 8 mm Maximal width of head in holotype 2 1 mm, pronotum 2 9 mm, elytra 2 8 mm Height of pronotum in holotype 2 2 mm, elytra 1 7 mm Pronotum, width/length = 1 20, width/height = 1 30 Elytra, width/length = 1 00, width/height = 1 69

Head Punctures small, superficial, separated from each other by 6–10 times their own diameter Antero lateral margins distinctly raised, clypeus moderately emarginate, clypeal line represented by only vague traces, eyes flattened, head widest at eyes (Fig 34) 3rd antennal segment 2 8 times as long as the 2nd and longer than 4th+5th

Pronotum Punctures smaller and more superficial than on head, separated from each other by 4–10 times their own diameter Pronotum 1 38 times as broad as head, a little broader than long and very convex, anterior margin strongly curved, lateral outline broadly rounded

Elytra Microreticulation present only in vague traces as irregular furrows, otherwise absent, punctures very smal, superficial, hardly visible, separated from each other by 10–15 times their own diameter Just a little narrower than pronotum, as broad as long and moderately convex, lateral outline with very weakly defined humeral angle

Meso- and metasternum Median carina distinct, lateral lines absent, femoral lines incomplete, rounded at middle

Metathoracic wings absent

Legs Male hind femora with a pronounced tooth at posterior margin (Fig 35) Tarsal formula 5–5–4 in male, female unknown, 1st tarsal segment greatly enlarged, 2nd and 3rd tarsal segments moderately enlarged

Genitalia Aedeagus as in Figs 36, 37, spermatheca as in Fig 38

DERIVATIO NOMINIS From its large size, *A giganteum* sp n is the largest known species of the genus *Agathidium*

DIFFERENTIAL DIAGNOSIS *A giganteum* sp n differs clearly from other Chinese species of *A* (*A*) *madurense* species group in size and in greater length ratio 3rd/2nd antennal segments, from *A inerme* Angelini et De Marzo, 1998 (*A* (*A*) *dentatum* species group), another very large species (length 5 60–5 95 mm) it differs in the ratio of 3rd/2nd antennal segments

Agathidium (*Agathidium*) *seminulum* group

(Anterior margin of head not raised, elytra with sutural striae, dorsum microreticulate)

***Agathidium* (*Agathidium*) *janatai* sp. n.**

(Figs 39–42)

TYPE MATERIAL Holotype male China S Gansu Labrang, valley E of Ponggartang 35 14 N 102 55 E ca 2700 m coniferous forest 9 VII 1995 Janata lgt deposited in SC

DESCRIPTION Dorsum uniformly dark reddish-brown, mesosternum reddish-brown, metasternum darker, antennae uniformly testaceous, legs reddish-brown Microreticulation impressed on whole dorsum, puncturation fine and sparse on head and pronotum, more clearly impressed on elytra Sutural striae clearly impressed, extending from apex to the middle of the elytra

Length 3 7 mm, head 0 8 mm, pronotum 1 1mm, elytra 1 8 mm Maximal width of head 1 4 mm, pronotum 1 8 mm, elytra 1 8 mm Height of pronotum 1 1 mm, elytra 0 8 mm Pronotum, width/length = 1 67, width/height = 1 63 Elytra, width/length = 1 01, width/height = 2 20

Head Microreticulation clear and uniform, punctures small, separated from each other by 3–4 times their own diameter Antero-lateral margins uniform, clypeus weakly emarginate, clypeal line superficial hardly visible, eyes flattened, widest just behind eyes, temple 1/3 length of the eyes length (Fig 39) 3rd antennal segment 1 6 times as long as the 2nd and as long as 4th+5th

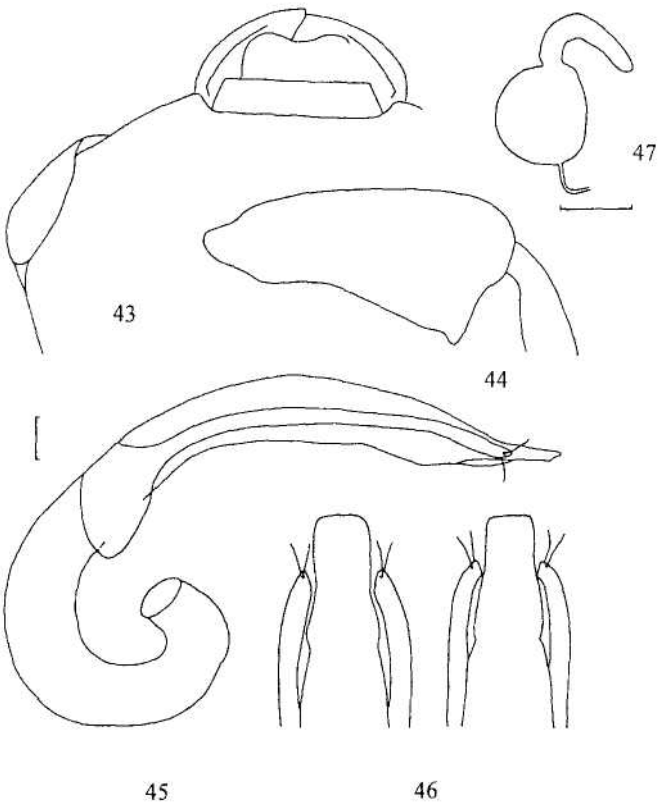
Pronotum Microreticulation clear and uniform, as on head, puncturation as on head but more superficial Pronotum 1 33 times as broad as head, moderately broader than long and moderately convex, anterior margin weakly curved, lateral outline broadly rounded

Elytra Microreticulation more superficial than on head, punctures larger, superficial, separated from each other by their own diameter As broad as pronotum, a little broader than long and slightly convex lateral outline with very weak humeral angle

Meso- and metasternum Median carina weak, lateral lines absent, femoral lines complete, rounded at middle

Metathoracic wings absent

Legs Male hind femora with a pronounced tooth at posterior margin (Fig 40) Tarsal formula 5–5–4 in male female not known



Figs 43 47 *Agathidium (Agathidium) puetzi* sp n (43 46) 43 head 44 male hind femur 45 aedeagus lateral view 46 aedeagus dorsal and ventral views 47 *A (Agathidium) gonggaense* Angelini et De Marzo spermatheca Scale = 0 1 mm

Genitalia Aedeagus as in Figs 41, 42

Derivatio nominis Dedicated to Miroslav Janata, captor of the species

Differential diagnosis *A janatai* sp n differs clearly from Chinese species of the *A* (*A*) *seminulum* species group in shape of head, which is widest just behind eyes, temple 1/3 the length of the eyes (widest at eyes in *A uliginosum* Angelini et Švec, 1994 and *A jendeki* Angelini et Švec, 1995)

Agathidium (*Agathidium*) *uliginosum* Angelini et Švec, 1994

Agathidium (*Agathidium*) *uliginosum* Angelini et Svec 1994 17

Material examined 3 females China W Sichuan Daxue Shan Hailuogou Glacier Park (Gongga Shan) Camp I 2100 m 29 36 N/102 04 E 27 28 v 1997 Wrase lgt deposited in PC

Distribution China (Yunnan, new for Sichuan)

Agathidium (Agathidium) dentatum group

(Anterior margin of head not raised, elytra without sutural striae, dorsum not microreticulate)

Agathidium (*Agathidium*) *puetzi* sp. n.

(Figs 43–46)

Type material Holotype male China Shaanxi Qin Ling Shan 107 56 E 33 45 N, Autoroute km 93 S of Zhouzhi 108 km SW Xian Mountain forest sifted 1650 m 1 2 ix 1995 Putz lgt deposited in PC

Description Dorsum uniformly black, mesosternum testaceous, metasternum reddish-brown, antennae uniformly testaceous, legs reddish-brown Microreticulation, apart from vague traces on elytra absent, puncturation fine and sparse on whole dorsum Sutural striae absent

Length 4 2 mm, head 1 0 mm, pronotum 1 4 mm, elytra 1 8 mm Maximum width of head in holotype 1 4 mm, pronotum 1 9 mm, elytra 1 9 mm Height of pronotum 1 5 mm, elytra 1 0 mm Pronotum, width/length = 1 35, width/height = 1 31 Elytra, width/length = 1 05, width/height – 1 86

Head Punctures very small, superficial, separated from each other by 2–10 times their own diameter Widest at eyes, antero-lateral margins uniform, clypeus weakly emarginate, clypeal line absent, eyes flattened (Fig 43) 3rd antennal segment 1 4 times as long as the 2nd and as long as 4th+5th together

Pronotum Puncturation as on head Pronotum 1 4 times as broad as head, slightly broader than long (width/length = 1 35) and very convex, anterior margin weakly curved, lateral outline broadly rounded

Elytra Microreticulation present only in vague traces, punctures larger than on head, superficial, separated from each other by 2–5 times their own diameter As broad as pronotum, moderately broader than long and slightly convex, lateral outline with very weak humeral angle

Meso- and metasternum Median carina sharp, lateral lines absent, femoral lines incomplete, rounded at middle

Metathoracic wings absent

Legs Male hind femora with a pronounced tooth at posterior margin (Fig 44) Tarsal formula 5–5–4 in male, female not known

Genitalia Aedeagus as in Figs 45, 46

Derivatio nominis Dedicated to Andreas Putz the captor of the species

Differential diagnosis *A puetzi* sp n is similar to *A yunnanicum* Angelini et Švec, 1994 in both size and coloring of dorsum, it differs in its lesser length ratio of 3rd/2nd antennal segments, elytra with sparser puncturation, and aedeagus with truncate apex

Agathidium (*Agathidium*) *laevigatum* group
(Anterior margin of head not raised, elytra without sutural striae, dorsum microreticulate)

***Agathidium* (*Agathidium*) *gonggaense* Angelini et De Marzo, 1998**
(Fig 47)

Agathidium (*Agathidium*) *gonggaense* Angelini et De Marzo, 1998 357

MATERIAL EXAMINED 2 males, 1 female China W Sichuan, Daxue Shan, Hailuogou Glacier Park (Gongga Shan) Camp 1 2100 m 29 36 N/102 04 E, 27–28 V 1997, Wrase lgt , deposited in PC

NOTE Species was described from three male specimens, the spermatheca is figured (Fig 47) here, the formula of the female is 5–4–4 The female specimen exhibits a more uniform and more clearly impressed microreticulation on the pronotum
DISTRIBUTION China (Sichuan)

Acknowledgement

Our thanks belong to Jonathan Cooter (Hertford, UK) for the reading of the manuscript

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ISSN 1211 376X

BOOK REVIEW

LIEW F Y COX F E G, volume editors **Immunology of Intracellular Parasitism** Karger, Basel Freiburg Paris London New York, New Delhi, Bangkok Singapore, Tokyo, Sydney, 1998 XI+204 pages Format 170×240 mm Hard cover Price CHF 227 00 (Institutions), 113 50 (Individuals) ISBN 3-8055 6621-2

This monograph appeared in print in the series "Chemical Immunology" (formerly "Progress in Allergy"), Volume No 70 As stated in the preface by the volume editors, intracellular habitat provides a secure environment for many microorganisms but those that parasitize the cells of the immune system, in particular macrophages and lymphocytes life on a knife edge between survival and triggering a potentially destructive immune response All intracellular organisms evolved mechanisms of evading the immune response with the consequence that the infections they cause tend to be long and chronic and accompanied by counter-productive reactions The purpose of this volume is to explore the immune responses to important intracellular pathogens – two bacterial species and nine protozoic parasites The volume consists of nine chapters subdivided into subchapters (up to 23) Each chapter is concluded by actual references comprising up to 235 quotations There are 17 figures and 6 tables depicting and summarizing presented biological data

Chapters 1 and 2 examine the immunity to *Listeria monocytogenes* and to mycobacteria Listeriosis has long been regarded as the prototype of the T cell-mediated immunity and has served to draw attention to the microbial function of macrophages neutrophils, NK cells and T lymphocytes The purpose of this chapter is to draw attention to some of the discrepancies and contradition in the literature dealing with this subject In mycobacterial infections analysed are mycobacterial diseases various types of immune cells and mediators, antigens and novel vaccines Chapter 3 is devoted to experimental cutaneous leishmaniasis *Leishmania major* infections in murine models have been especially useful for studies of immune responses and regulations Chapter 4 explores the immunoregulation during toxoplasmosis the host and parasite factors affecting susceptibility to *Toxoplasma gondii*, adaptive and innate immune responses, tachyzoite to bradyzoite transformation, the brain involvement, control and pathogenesis, and vaccination Chapter 5 lays emphasis on immunological control of *Cryptosporidium* infection In the development of effector mechanisms involved are T and B cells, interferon gamma and other cytokines Chapter 6 provides a look at immunology of *Trypanosoma cruzi* Past two decades have seen advances in the study of molecular and cellular immunoregulation Unfortunately, little of the research in this area has led to tools for disease prevention or management Particular attention concentrates here on the role of T cells in *T cruzi* infections, including the transforming growth factor beta and the interleukin 10, cytokine and autoimmune responses in human infections Chapter 7 focuses on the immune response to malaria parasites with respect to the role of T cells and involvement of antibodies and spleen in resistance to asexual blood stages Interaction between T cells macrophages neutrophils and parasitized red cells leads to parasite death via release of mediators such as free oxygen radicals and NO derivates produced by phagocytic cells Chapter 8 provides insights into the immunobiology of infections with *Theileria parva* in cattle while discussing the parasite-host cell relationship, immune responses to sporozoites and parasitized lymphocytes, variability of immune response in various animals and the vaccine development Concluding chapter 9 comprises recent advances in the immunobiology of infections with African trypanosomes causing disease in man and domestic animals in sub-Saharan regions These extracellular kinetoplastid protozoans developed remarkable ways of evading the immune response based upon antigenic variation Among the topics discussed are immunosuppresion and suppressor macrophage activity, the role of the gamma interferon and mechanisms of macrophage activation during trypanosomiasis

Intracellular prokaryotic and eukaryotic organisms represent subjects stimulating interest in many scientific areas associated with infectious diseases of humans and animals Nine chapters of this publication arranged by 17 international experts present a synthesis of recent knowledge relevant to immune responses to important intracellular parasites This volume offers most complete and balanced coverage of information so far dispersed only in journal communications

Jindrich Jira

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Record of *Hipposideros doriae* (Mammalia: Chiroptera) from Sabah (East Malaysia) and remarks to species status of *Hipposideros sabanus*

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Abstract The contribution presents the first record of *Hipposideros doriae* (Peters 1871) from the territory of Sabah and the second record of this species at all Detailed morphological description is given the baculum of the species is described for the first time The examination of the type specimens (the lectotype and paralectotype specimens have been designated) and other comparative material confirmed the previous hypothesis that the name *H doriae* is the senior synonym of the name *H sabanus* (Thomas 1898) It is concluded that up to present the species *H doriae* is known from the large part of the Indo Malayan Region i e from N Sumatra Malaya and N Borneo

Taxonomy, Hipposideridae, *Phyllorhina*, Borneo, Indo-Malayan Region

INTRODUCTION

The species *Hipposideros doriae* was described by Peters (1871) from Sarawak, Borneo, under species name *Phyllorhina doriae* It was defined (Peters 1871 326 327) as a small round leaf bat close to *H pygmaeus* (Waterhouse, 1843) in size, but similar to *H bicolor* (Temminck, 1834) in constitution of noseleaf and ears This description is very simplified, the only important characteristic (besides external measuremets, viz Tab 1) is that posterior noseleaf is a simple depression without supporting septa So far, this species was known only from the type specimen and therefore its distribution is denoted only as terra typica Sarawak (Hill 1963, Corbet & Hill 1992, Pavlinov et al 1995 etc)

Regardless of Meadway (1965 56) writing that "the type of *doriae* is not available" Hill (1963 45–46) mentions that from the old correspondence of O Thomas from 1902 is arising that the type specimen has been deposited in Museo Civico di Storia Naturale, Genoa, Italy (according to the letter of R Gestro from this museum) However, Peters (1871 327) mentioned in species description of *Phyllorhina doriae* about origin and deposition of type specimen "Von Sarawak auf Borneo aus der Sammlung des Hrn Marquis J Doria (4007 M B [= Berlin Museum])' Indeed, in the collection of Museum für Naturkunde in Berlin, Germany, there is a couple of male individuals of *P doriae* description (as cotypes, under Nos BZM 4007/1 and 4007/2) The question is arising, whether the individual examined by R Gestro for O Thomas in Genoese Museum in 1902 was one of the couple of Berlin cotypes or another third specimen from the collection of G Doria, deposited in Genoese Museum Whatever the number of specimens of *H doriae* from Doria's Collection is, if either two or three, they are the only known individuals of this species, moreover without determination of exact locality of their collection Nevertheless, as type specimens of description of *Phyllorhina doriae* there is necessary to consider two specimens under No 4007 in Berlin Museum, as exactly designated by Peters (1871 327) However, these specimens have not been revised so far

Dobson (1878) wrote that *H. doriae* "resembles *H. bicolor* very closely". Later, Tate (1941) and Hill (1963) included *H. doriae* into *H. bicolor*-group. Hill (1963) concurrently refered it to the close similarity to the species *H. sabanus* (Thomas, 1898), which was described from Lawas, NE Sarawak, Borneo. Until present, *H. doriae* is known from Borneo also from its type locality only (Meadway 1965, Payne & Francis 1998). Nevertheless, *H. sabanus* was besides Borneo recorded in Peninsular Malaysia and in northern Sumatra (Chasen 1940, Hill 1963, 1967, Meadway 1978, Heller & Volleth 1989). Hill (1963), Harrison (1964), Corbet & Hill (1992), Koopman (1994) and Pavlinov et al. (1995) refer about the possible synonymity of both forms.

In 1999, in the course of expedition to Sabah, NE Borneo, an individual of *H. doriae* has been found in among another bat species. This is the first record of the species from the territory of the State of Sabah, and first of all, the first finding after its description by Peters (1871). This important finding allows to complement knowledge of the morphology of this almost unknown species and to comment the taxonomical position in relation to its close form, *H. sabanus*.

ABBREVIATIONS

COLLECTIONS. BM – Natural History Museum, London, U. K.; BZM – Museum für Naturkunde in Berlin, Germany; NMW - Naturhistorisches Museum Wien, Austria; SMF – Senckenberg Forschungsinstitut, Frankfurt am Main, Germany

WING MEASUREMENTS (Tab. 1). LAt – forearm length; LPo – thumb length; LPIIIp – length of proximal phalanx of the third finger; LPIIIm – length of medial phalanx of the third finger; LPIVp – length of proximal phalanx of the fourth finger; LPIVm – length of medial phalanx of the fourth finger; LPVp – length of proximal phalanx of the fifth finger; LPVm – length of medial phalanx of the fifth finger.

NOSELEAF MEASUREMENTS (Tab. 2). LPhN – greatest length of noseleaf; LaPhA – width of anterior noseleaf (horseshoe); LaPhP – width of posterior noseleaf.

CRANIAL MEASUREMENTS (Tab. 3). LCr – greatest skull length (incl. praemaxillae); LCc – condylo-canine skull length; LaZ – zygomatic breadth; LaI - width of interorbital constriction; LaN – width of braincase; CM^3 – length of upper toothrow; CC – rostral width on lateral margins of upper canines; P^4P^4 – rostral width on lateral margins of upper premolars; M^3M^3 – rostral width on lateral margins of third upper mollars; ACr – braincase hight (without bullae); LMd – mandible length; ACo – coronoid high; CM_3 – length of lower toothrow.

DESCRIPTIVE PART

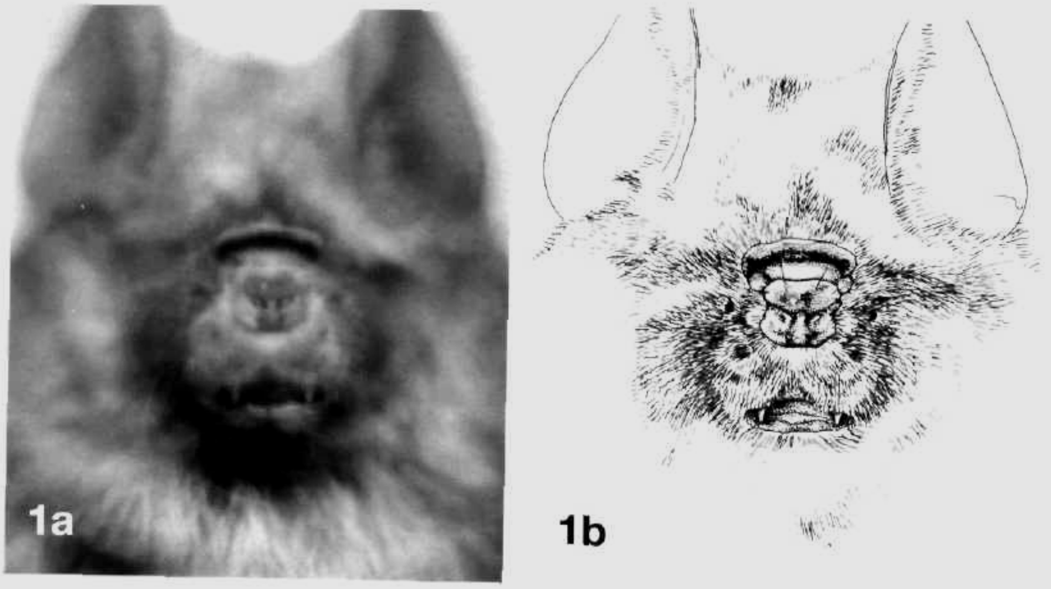
Finding circumstances

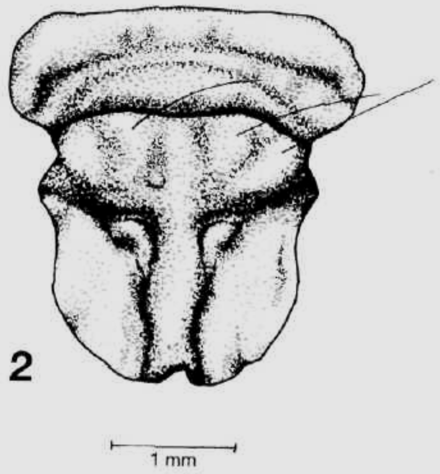
The bat was caught at locality Gunung Emas (= Mt. Emas), Crocker Range, 53 km by road from Kota Kinabalu to Tambunan, district Pantai Barat, Sabah (East Malaysia), Borneo; 5° 50' N, 116° 20' E, ca. 1800 m a. s. l.; 20 April 1999; leg. P. Benda. The bat was caught in a woody lodge surrounded by montane "misty" forest. The specimen is adult male and presently is deposited in Naturhistorisches Museum Wien, Austria (NMW 61352, field No. pb 1426; alcohol specimen, skull and baculum removed).

Description

MEASUREMETS. Basic external measurements: length of head and body 46 mm, tail length 30 mm, right forearm length 37.1 mm, left forearm length 36.9 mm, ear length 15.6 mm, weight 4.9 grams. The wing measurements are given in Tab. 1.

COLORATION. Dorsal hair is of very dark greyish-brown, hair on bellow side is moderately lighter. The hair coloration is much darker than in other examined Bornean species of genus *Hipposideros* (spp. *H. cervinus*, *H. dyacorum*, and *H. diadema*). Wing membranes are dark brown, as well as ears. Anterior and intermediate noseleafs are light, non pigmented; posterior noseleaf is dark greyish-brown with the darkest shade on the posteror margin (Fig. 1).





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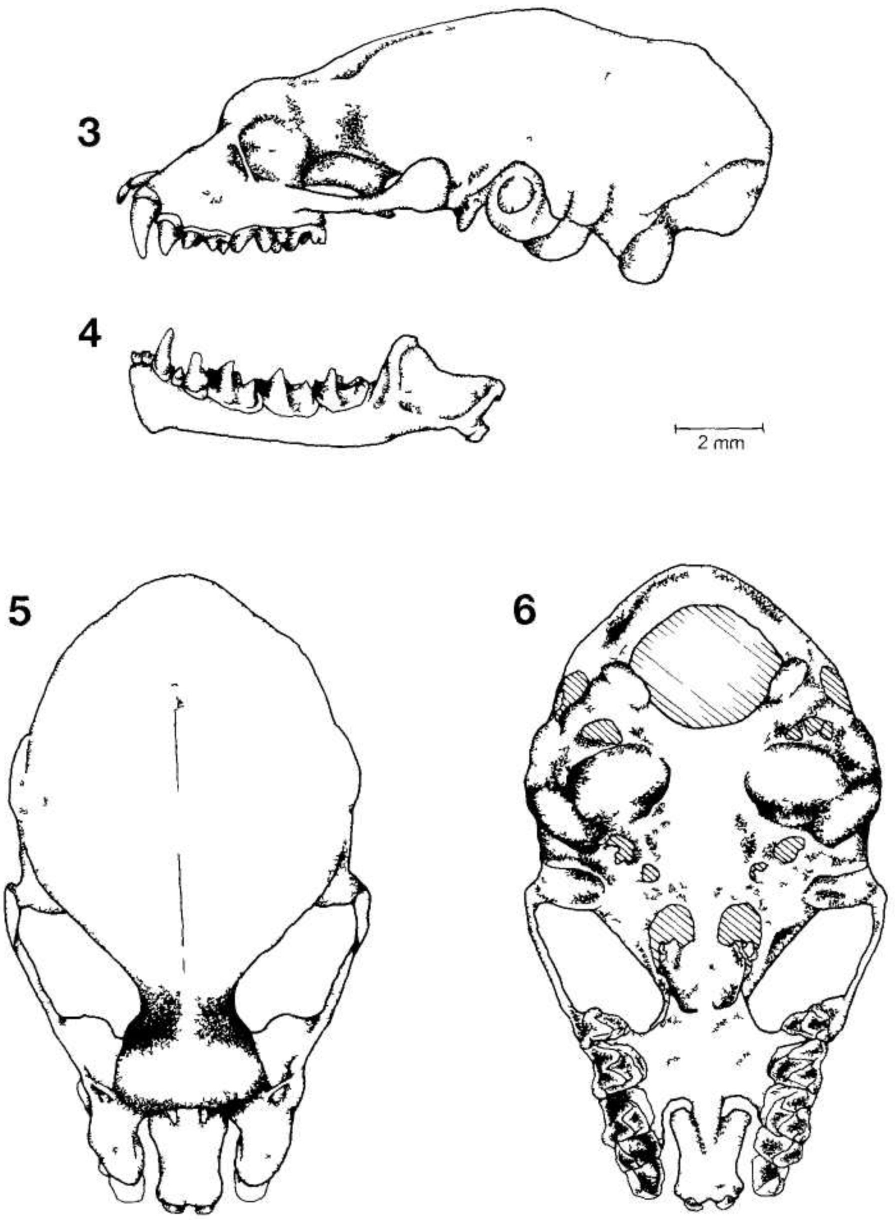
Figs 1–2. Noseleaf of *Hipposideros doriae* (Peters) from Gunung Emas, Sabah (NMW 61352). 1a – a photograph of head of the fresh specimen; 1b – schematical drawing of the same view; 2 – a drawing based on alcohol preserved specimen.



Figs 3-6 Skull of *H. doriae* (Peters) from Gunung Emas, Sabah (NMW 61352) 3 lateral aspect 4 lateral aspect of the left mandible 5 dorsal aspect 6 basicranial aspect

Tab 1 Wing measurements of examined specimens of *Hipposideros doriae* (Peters) * data taken from Peters (1871) for abbreviations of measurements see text data are in millimetres

No		sex	LAt	LPo	LPIIIp	LPIIIm	LPIVp	LPIVm	LPVp	LPVm
NMW 61352		m	36 9	2 4	13 7	17 3	10 3	7 3	11 5	9 8
SMF 69292		f	34 2	2 5	12 4	17 0	9 1	6 8	10 3	9 1
BZM 4007/1	lectotype	m	35 5	2 8	12 5	15 6	8 6	5 3	10 2	6 6
BZM 4007/2	paralectotype	m	34 6	2 5	12 6	15 8	9 5	5 2	10 5	5 1
BZM 4007*	holotype	m	34 0		12 5	15 5	9 5	6 3	10 5	8 5

NOSELEAF (Figs 1–2) In relation to size of face, noseleaf is rather small, it is simple, without supplementary lateral leaflets The anterior noseleaf is modest narrow horseshoe, moderately concave, rostrally interrupted by swollen internarial septum The septum is rostrally terminated by shallow notch' or ' fold", imperceptible in fresh specimen (this fold is probably caused by alcohol denaturation, compare Figs 1 and 2) The nostrils are laterally overloped by small narial lappets Cushion-lake intermediate leaf is unconspicuously divided into five equal parts of triangular or oblong shapes The posterior noseleaf is comparatively large and high, without supporting septa, its posterior margin is straight and upright, laterally is moderate rostrally curved The whole noseleaf is covered by short hairs, and the intermediate leaf holds several longer hairs The frontal sac leads into ca 1 mm broad transversal orifice In relation to size of noseleaf, the frontal sac is not so small Measurements of noseleaf are given in Tab 2 Noseleaf nomenclatory was taken from Corbet & Hill (1992 82)

OTHER EXTERNAL CHARACTERS Ears are triangular, broad, not acutely pointed Antitragus is low and thickened, without notch separating antitragus from pinna The tail composes from five vertebrae, free tail tip sticks about 0 5 mm out the tail membrane Thumb is short, with short and massive claw Penis is long and unpigmented, in fresh specimen is bright fleshy pink

SKULL (Figs 3 6) The skull is small with short facial part and large neurocranial part The neurocranium is broad, in anterior part, there is well developed lower sagittal crest The rostrum is short and rather lower, the frontal depression is shalow The interorbital constriction is narrow and high The lachrymal crest is well developed, the anteorbital foramen is high, closed by a very slender and high bar The zygomatic arches are relatively narrow, the jugal processes are high The palate is short, broader than long, palate broad length ratio is ca 2 1 Praemaxilla is short and broad, X-shaped Basic cranial measurements are given in Tab 3

DENTITION (Figs 6–8) The dental formula is 1-1-1-3/2-1-2-3 Upper incisors are simple, long and without additional lobes Upper canines have three small notches on lingual part of cingulum and low transversal (labio-lingual) crest in fossa (left upper canine is damaged) Smaller anterior upper premolars (P^2) are absent in both maxillar toothrows The only present upper premolars (P^4) are in

Tab 2 Noseleaf measurements of examined specimens of *Hipposideros doriae* (Peters) * data taken from Peters (1871) ** data taken from Thomas (1898) for abbreviations of measurements see text data are in millimetres

No		LPhN	LaPhA	LaPhP
NMW 61352		5 3	3 8	4 5
SMF 69292		5 6	4 4	4 6
BZM 4007/1	lectotype *doriae*	4 7	3 5	4 6
BZM 4007/2	paralectotype *doriae*	4 5	3 6	4 7
BZM 4007*	holotype *doriae*	4 7		4 2
BM 93 3 11 12**	holotype *sabanus*	5 0	3 7	

Tab. 3. Cranial measurements of *H. doriae* (Peters, 1871); † data taken from Heller & Volleth (1989); BM (Natural History Museum, London) data taken from Hill (1967): BM 93.3.11.12 = holotype of *H. sabanus* (Lawas, Sarawak, Borneo), BM 61.1716 = specimen from Perak, Malaya, BM 27.5.9.3 = specimen from N-Sumatra; for abbreviations of measurements see text, data are in millimetres

No.	LCr	LCc	LaZ	LaI	LaN	CM^3	CC	P^{4}P^4	M^{3}M^3	ACr	LMd	ACo	CM$_3$
NMW 61352	15.02	12.53	8.23	1.83	6.92	4.68	3.75	4.52	5.63	4.93	8.68	2.28	4.88
SMF 69292	14.92	12.77	8.48	2.12	7.37	4.73	3.54	5.07	5.75	4.88	9.02	2.17	5.02
SMF 69292†	15.10	12.80	8.50	–	–	4.80	3.70	–	5.80	–	8.90	–	5.10
BZM 4007/1	–	12.32	8.30	2.23	6.90	4.58	3.55	4.43	5.53	–	8.53	2.17	4.72
BZM 4007/2	–	–	–	–	7.20	4.45	–	–	–	–	8.70	2.13	4.65
BM 93.3.11.12	15.40	–	8.80	–	–	5.10	3.60	–	5.90	–	–	–	5.60
BM 61.1716	–	–	–	–	–	4.40	3.20	–	5.30	–	–	–	–
BM 27.5 9.3	15.30	12.90	–	–	6.90	5.00	–	–	–	–	–	–	5.60

contact with canines in more than half of mesial edge; on the mesial part of cingulum, there are three minute cusps. Additional cusps (paraconules and metaconules) and ridges are never present on upper mollars. The crown areas of second lower incisors are moderately greater than those of the first ones. On mesial and distal parts of cingulum on lower canines, the small cusps are present. The smaller lower premolars (P_2) are long ca. $^1/_3$ of mesio-distal length of second lower premolars (P_4) (in occlusal view – viz. Fig. 8) and they are in axis of toothrow, not extruded off it.

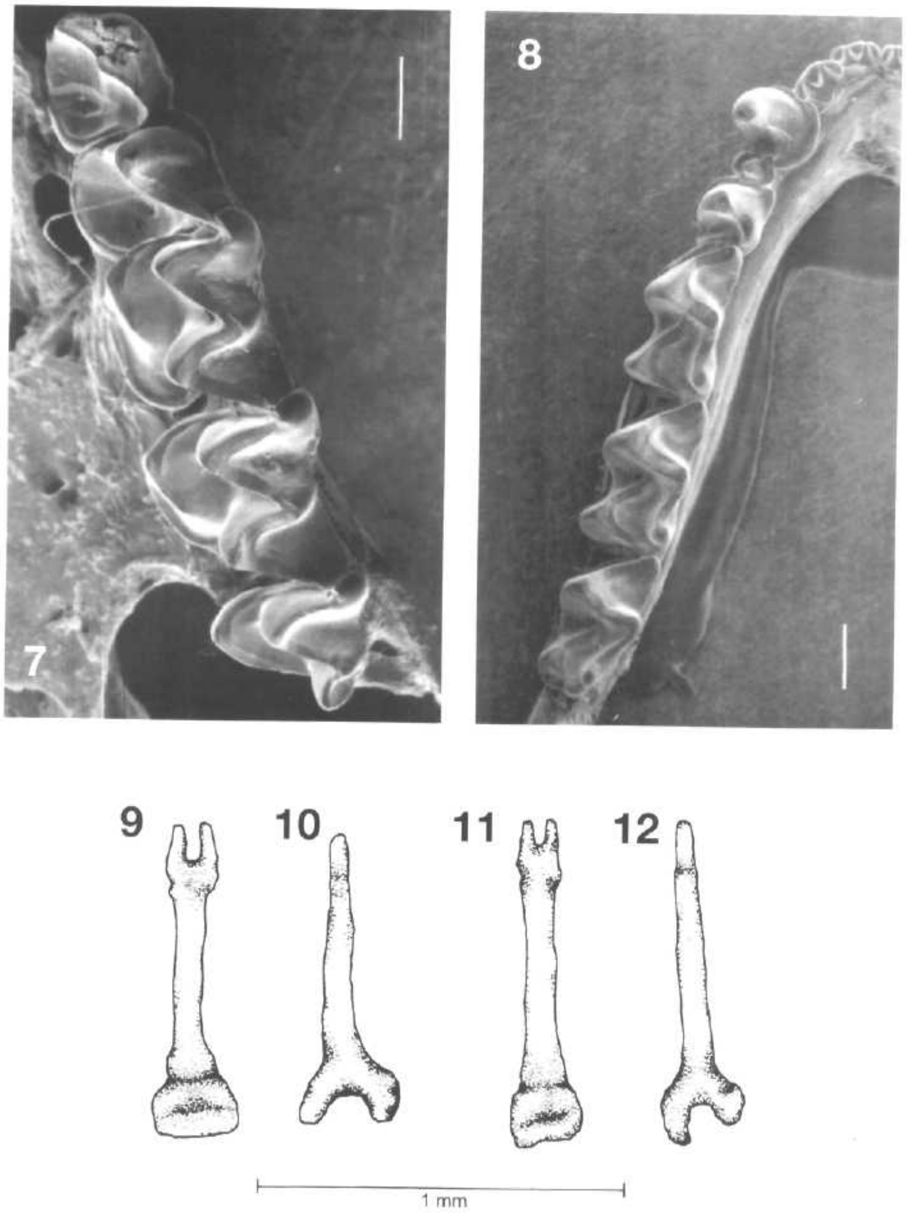
BACULUM (Figs 9–10). Baculum is narrow bar dichotomically divided on both terminations. Distal termination is fork-like divided into two narrow processes promined distally in longitudinal axis. Distal division lies in transversal plane. Asymmetric (in horisontal and vertical directions as well) proximal termination holds two broad and flat processes, the divisions lies in medial plane. The upper process is thicker and shorter than the lower one. The length of baculum is 0.86 mm, greatest width (on proximal termination) is 0.26 mm.

COMPARATIVE PART

MATERIAL EXAMINED. **Borneo** (three specimens): *Hipposideros doriae*, NMW 61352, male, alcohol specimen, skull and baculum removed; Gunung Emas, Sabah, Borneo (for details see above); 20 April 1999; leg. P. Benda. *Phyllorhina doriae*, two cotype specimens, BZM 4007/1 (lectotype specimen by present designation) and BZM 4007/2 (paralectotype specimen by present designation), males, alcohol specimens, skulls removed (4007/2 partly damaged), one baculum removed (4007/2); Sarawak, Borneo, coll. Marq. G. Doria (viz. Peters 1871). **Malaya** (one specimen): *Hipposideros sabanus*, SMF 69292, female, alcohol specimen, skull removed; Ulu Gombak, Field Studies Centre, 20 km NW Kuala Lumpur, Malaysia, 260 m a. s. l., 5 April 1984, leg. K.-G. Heller and M. Volleth (viz. Heller & Volleth 1989).

Basal taxonomic data

As it is shown above, Peters (1871) placed *H. doriae* close to the species *H. bicolor*. To the relation of this species (or directly in to *H. bicolor*-group), *H. doriae* was also included by Dobson (1878), Tate (1941), Hill (1963), Corbet & Hill (1992) and Pavlinov et al. (1995). The last three sources rank this species close to *H. sabanus*, and they think also about the possible synonymity of both names. This idea has been probably accepted by several authors (Meadway 1965, 1978, Payne & Francis 1998); f. e., in their lists of Bornean mammals, Meadway (1965) and/or Payne & Francis (1998) mentioned just only *H. sabanus*, although it is known on the base of just the only one record as well as *H. doriae*. Similary, Harrison (1964) does not show characteristics for *H. doriae* in his identification key, because it "is probably a synonym for *sabanus*".



Figs 7–12. 7–8 – dental characters of *Hipposideros doriae* (Peters) from Gunung Emas, Sabah (NMW 61352); scales = 0.5 mm. 7 – view on the occlusal surface of maxillar toothrow, C^1–M^3; 8 – view on the occlusal surface of mandibular toothrow, I_1–M_3. 9–12. Baculum of *H. doriae* (Peters). 9–10 – specimen from Gunung Emas, Sabah (NMW 61352); 11–12 – paralectotype specimen from Sarawak (BZM 4007/2). 9 and 11 – dorsal aspect; 10 and 12 – lateral aspect.

Thomas (1898) according to the absence of P’, compared *H. sabanus* to Afro-Arabian species *H. megalotis* (Heuglin 1862) but according to the reduction of noseleaf, he did not find close species. Tate (1941), on the base of cranial characters ranked it among *H. galeritus* group (noseleaf characters he does not consider as important), however to the subgroup close to *H. bicolor*-group. Tate's (1941) conclusions was from the majority accepted by Hill (1963), but in contrary, he included *H. sabanus* into *H. bicolor*-subgroup, which is near to *galeritus*-subgroup. Corbet & Hill (1992) and Pavlinov et al. (1995) placed *H. sabanus* into *bicolor*-group.

Thus gradually, both species, *H. doriae* and *H. sabanus*, has became to be considered as the members of *H. bicolor*-group and based on Hill's (1963) revision it has been throught about possible conspecifity of these forms. Both are characterised by the small body dimensions and by very closed form of noseleaf (Hill 1963, Corbet & Hill 1992): reduced size and form, absence of lateral leaflets, absence of supporting septa on posterior leaf. These characters together (i. e. so simple noseleaf) are not present in any other *Hipposideros* species. As the only difference between *H. doriae* and *H. sabanus*, both sources mention the presence of medial emargination on anterior noseleaf (in *H. sabanus*) or the absence of it (in *H. doriae*).

Taxonomic comparison

According to the characters shown by Hill (1963), the newly obtained individual (NMW 61352) from Gunung Emas, Sabah, is undoubtly *Hipposideros doriae* (Peters, 1871), becouse on the noseleaf of fresh specimen a notch in anterior margin of horseshoe was not observed (Fig. 1). This "notch" is present only in alcohol preserved specimen, probably as result of denaturation, and only as a fold of margin, which can be straightened by pulling of lateral parts of horseshoe. In analogical condition, this character was observed in both cotype specimens of *P. doriae* from Berlin Museum (BZM 4007/1, 4007/2). In the only examined non-Bornean specimen of *doriae*–*sabanus* complex collected in Malaya (SMF 69292, viz. Heller & Volleth 1989), there is slightly visible a moderate notch that can be also straightened. Type specimen of *H. sabanus*, deposited in Natural History Museum, London, and examined by Hill (1963: 44–45) has this emargination certainly present (viz. also Thomas 1898, 1902, Tate 1941).

The only examined female (SMF 69292) has moderately broader anterior leaf than examined male specimens.

The next character confirming the species identification of Sabah specimen as *H. doriae* is the shape and structure of baculum. Bacula are almost identical in both Sabah specimen and cotype specimen (Figs 9–12).

From the comparison of all characters of *H. sabanus* mentioned by Hill (1963: 44–45) results that they are identical or very close to the three individuals of *H. doriae* (two cotype specimens, Sabah specimen) in almost all examined characters, namely in: (1) wing, noseleaf and skull measurements (Tables 1–3), Sabah specimen has comparatively larger wing dimensions than other examined specimens, but Hill (1967: 59) mentions the measurements of three London Museum specimens of *H. sabanus* 37.9 mm (type specimen of *sabanus*), 36.5 mm (specimen from Malaya), and 37.3 mm (specimen from Sumatra), and Meadway (1978: 28) notes the range of forearm length 34–37 mm, (2) very dark hair coloration – dark coloration observed in *H. doriae* from Sabah is described also in the type specimen of *H. sabanus* (Thomas 1898: 243), (3) whole ear form, constitution of antitragus, (4) simple constitution of noseleaf (absence of supporting septa on posterior leaf, absence of supplementary leaflets), and the general shape of noseleaf, (5) cranial non-metric characters incl. dentition, with exception of premolar characters.

The differences between examined individuals of *H. doriae* and the respective character states in *H. sabanus* as given by Hill (1963) are these: (1) clearly visible emargination on the rostral margin of anterior leaf as describe in *H. sabanus* is in case of *H. doriae* unclear or missing (comp. Figs 1–2, and Fig. 5, *Plate 13 in Payne & Francis 1998*), (2) in *H. sabanus* there is described P_2 of the size $^1/_4$ of P_4 and "slightly extruded from the toothrow" (Hill 1963: 45). In case of *H. doriae* from Sabah, the P_2 is aligned to axis of toothrow and of approx. $^1/_3$ of size of P_4 (Fig. 8). However, Tate (1941: 366) evaluates this character in case of type specimen of *H. sabanus* as "lower anterior premolar less than half the height of crown of p_4", in the specimen from Malaya (SMF 69292) is P_2 long ca. $^1/_3$ of the length of P_4 and it is broad ca. $^2/_3$ of the breadth of P_4, P_2 is moderately shifted in buccal direction from the toothrow, (3) disputable or at least unequaly evaluated character is the presence/absence of P^2, in the case of *H. doriae* the P^2 is not present in any of three studied specimens – neither in the "type specimen" from Genoese Museum, as recorded by Hill (1963: 47). In the type specimen of *H. sabanus* is, however, described as either missing – "no minute premolar present" (Thomas 1898: 243) or as obsolete (Tate 1941: 388, Hill 1963: 45), in Malayan specimen (SMF 69292), it has been present only *in the left toothrow "als winziger Zahnstummel" and in the right toothrow is* missing (Heller & Volleth 1989: 259), however, the tooth-rest in the left toothrow was not observed by author's examination.

DISCUSSION AND CONCLUSIONS

The comparison of characters of all known individuals of *doriae-sabanus* complex (literary data including) clearly shows that any of these individuals do not differ in any of important character. The differences described in dentition – the degree of reduction and/or the position in the toothrow of upper and lower premolars, the gradients respectively, are of normal level of interspecific variation as they are generally known in another bat species. Thus, these differences seem not to be of *taxonomical significance*.

The most significant difference (by several authors) – absence or presence of notch in anterior margin of horseshoe – can be probably evaluated properly only using the fresh material of bats as shown in Figs 1–2. It seems that this character could be caused artificially, by affection of variable strenght of denaturation agent on individual parts of noseleaf that is composed by variably strong desmal tissue. It is important to note that all evaluated specimens are alcohol preparates with extracted skull, i. e., in the condition which can further contribute to the noseleaf deformation. It seems quite probable that neither Thomas (1898) nor Hill (1963) did have any fresh material when they had been describing this character. Therefore, it is impossible to state for sure how the noseleaf in the type specimen of *H. sabanus* would look like without being affected by alcohol or other denaturation agent.

Until further differences between *doriae* and *sabanus* are demostrated (as it possibly can arise from a profound morphological reexamination of whole this complex), both the names should be considered synonymous and, hence, the name *Hipposiderus sabanus* Thomas, 1898 is to be looked upon as a junior synonym of the name *Phyllorhina doriae* Peters, 1871 = *Hipposideros doriae* (Peters, 1871).

To disprove this steatment and gather that these species are very close sibling species, requires the data supported by statistical evaluation of all characters that all necessary (according to Hill 1963) for definition of (potential) individual species. This will be possible in the moment when more specimens from terra typica of both descriptions, i. e., from Sarawak, Borneo, will be available for further studies.

Based on the data listed above, it can be concluded the species *H. doriae* is presently known *from large part of Indo-Malayan Region, i. e. from northern Sumatra* (Chasen 1940, Hill 1963), from Malaya – the States of Perak, Pahang, and Selangor (Hill 1967, Meadway 1978, Heller & Volleth 1989), and from northern part of Borneo – from the both Malaysian parts, from Sarawak (Peters 1871, Thomas 1898) and from Sabah (this contribution). *H. doriae* is distributed from low altitudes

(Ulu Gombak, Selangor, Lawas, Sarawak) to sub-montane and montane forests (Fraser's Hill, Selangor, Maxwell Hill, Perak, Crocker Range, Sabah)

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Revision of family Scorpiopidae (Scorpiones), with descriptions of six new species

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Abstract. The family Scorpiopidae is revised, with diagnostic characters and geographic distributions given for all of its genera and species. Lectotypes are designated for *Scorpiops affinis* Kraepelin, 1898, *S. austerus* Hirst, 1911, *S. insculptus* Pocock, 1900, *S. solidus* Karsch, 1879, *Neoscorpiops satarensis* (Pocock, 1900), and *N. tenuicauda* (Pocock, 1894). The subgenus *Euscorpiops* Vachon, 1980, regarded in recent papers as a genus, is synonymized with the genus *Scorpiops* Peters, 1862. *Scorpiops affinis* Kraepelin, 1898, *S. crassimanus* Pocock, 1899, and *S. insculptus* Pocock, 1900 are synonymized with *Scorpiops hardwickii* (Gervais, 1843). *Scorpiops petersii vonwicki* Birula, 1913 is synonymized with the nominotypical *Scorpiops petersii* Pocock, 1893 and *Scorpiops kraepelini* Lourenço, 1998 is synonymized with *Scorpiops lindbergi* Vachon, 1980. The subspecies *Scorpiops hardwickii jendeki* Kovařík, 1994 is elevated to species. *Scorpiops braunwalderi* sp. n. (India: Uttar Pradesh), *S. dastychi* sp. n. (India, Uttar Pradesh), *S. feti* sp. n. (India, Sikkim and West Bengal), *S. margerisonae* sp. n. (China, Tibet), *S. problematicus* sp. n. (Thailand), and *S. sejnai* sp. n. (Vietnam) are described and a key to the genera and species of the family Scorpiopidae is provided. First records are established for *S. hardwickii* (Gervais, 1843) in China and Pakistan, and *S. asthenurus* in Bhutan.

Taxonomy, description, revision, new species, new combination, checklist, key, Scorpiones, Scorpiopidae, Oriental region

INTRODUCTION

The family Scorpiopidae includes 30 species in five genera inhabiting the Oriental region (Table 2). Type specimens are in a number of institutions, most of which kindly provided them as well as unidentified material. This has allowed me to include all of FKCP, HNHM, MBCZ, MZUF, NHMB, NMPC, SMFD, ZMHB, and ZMUH Scorpiopidae. Unfortunately, I have not been able to examine either the types or any other specimens of six species (*Alloscorpiops lindstroemii, Dasyscorpiops grandjeani, Scorpiops bhutanensis, Scorpiops oligotrichus, Scorpiops pachmarhicus, Scorpiops rohtangensis*.

MATERIAL AND METHODS

The institutional abbreviations listed below and used throughout are mostly after Arnett et al. (1993), only FKCP, MBCZ and ROCC are my own.

BMNH – The Natural History Museum, London, U. K.,
FKCP – František Kovařík Collection, Praha, Czech Republic,
HNHM – Hungarian Natural History Museum, Budapest, Hungary,
MBCZ – Matt E. Braunwalder Collection, Zurich, Switzerland,
MCSN – Museo Civico di Storia Naturale "Giacomo Doria", Genova, Italy,

MCZC – Museum of Comparative Zoology, Harvard University, Cambridge Massachusetts, USA,
MNHN – Museum national d Histoire naturelle Paris, France,
MZUF – Museo Zoologico de 'La Specola", Firenze, Italy,
NHMB Naturhistorisches Museum, Basel, Switzerland,
NMPC – National Museum (Natural History) Praha Czech Republic,
NZSI – National Zoological Survey of India, Calcutta, India,
ROCC – Lic Rolando Teruel Ochoa Collection, Museo de Historia Natural "Tomas Romay", Santiago de Cuba,Cuba,
SMFD – Forschungsinstitut und Naturmuseum Senckenberg, Frankfurt am Main, Germany,
ZMHB – Museum für Naturkunde der Humboldt-Universitat zu Berlin, Germany,
ZMUH – Zoologisches Institut und Zoologisches Museum, Universitat Hamburg, Germany

Other abbreviations are as follows M male, F female, A specimens preserved in alcohol, E specimens mounted dry im immature TL type locality TS type species, ht holotype, at allotype, pt paratype lt lectotype plt paralectotype

Type localities are given exactly as in the original descriptions and abbreviations are supplemented by details from labels or by current political units/divisions (e g Malaysia, Sarawak instead of just "Sarawak")

Under material, the country is followed by all information given on the locality label

Unfortunately, some locality labels are difficult to read which may have caused a few inaccuracies in their transcription Certain label data have proven altogether undecipherable

All specimen numbers, including those of Prof Vachon (e g VA 2399), are given for the sake of completeness, although I have been informed that no notations pertaining to Vachon's numbers can be found

This study was conducted in 1996–1999 Each examined specimen bears a label in Ariel or Times New Roman font produced on a laser printer Basic data are also penciled on the reverse of the label, as permanency of laser print in alcohol cannot be trusted The labels contain the generic and species name author and year of the original description whether the specimen is the holotype, lectotype or paralectotype, whether I have designated (dsg), determined (det) or only revised (rev) the specimen, and my name plus the year of the examination

Scorpiopidae Kraepelin, 1905

(Figs 1–72, Tables 1–3)

Pandinoidae Thorell, 1876 11 (in part) Ausserer, 1880 465 (in part)
Vejovini (in part) Kraepelin, 1894 181
Vejovidae Kraepelin, 1899 176 (in part), Pocock, 1900 64 Kraepelin, 1913 153 Birula 1917 57 (in part)
Iuridae (in part) Pocock, 1893 323, Pocock, 1894 77
Vaejovidae Pocock, 1899 266 (in part)
Scorpiopsinae Kraepelin, 1905 341 Francke, 1976 75, Sissom, 1990 114
Scorpiopsidae Stockwell, 1989 119, Stockwell, 1992 407, Kovařík, 1998 141, Lourenço, 1998 246

TYPE GENUS *Scorpiops* Peters, 1862

DIAGNOSTIC CHARACTERS Patella of pedipalp with 6–19 ventral trichobothria positioned in a row along the external margin, femur of pedipalp with 3 trichobothria, retrolateral pedal spurs present (Sissom 1990 74, fig 3 8B), sternum distinctly subpentagonal, cheliceral movable finger without a large darkened basal tooth on the internal margin, fingers of pedipalp with a double row of granules, median eyes always present, metasomal segments I–IV with paired ventral submedian keels This combination of characters differentiates family Scorpiopidae from all other scorpion families

COMMENTS Kraepelin (1905) erected Scorpiopsinae as a subfamily of Vaejovidae The fact that this family is inadequately defined was first pointed our by Stockwell (1989 119), who also elevated all the subgenera of *Scorpiops* to genera Since Stockwell's work (1989) is an unpublished dissertation, its taxonomic conclusions are not formal and binding However, Stockwell's conclusions were later published in Journal of Medicial Entomology (1992), where he concentrated on North American taxa but also mentioned the elevation of Scorpiopsinae to family status His conclusions were confirmed by Kovařík (1998 141–2) and Lourenço (1998 245), who formalized the change from subfamily to family status The grammatically incorrect name Scorpiopsidae is hereby modified to Scorpiopidae

Alloscorpiops Vachon, 1980
(Figs 8, 24, 26, Tables 1–3)

Scorpiops (*Alloscorpiops*) Vachon, 1980. 151; Bastawade, 1997: 104
Alloscorpiops Stockwell, 1989. 120; Sissom, 1990 114; Kovařík, 1998 141, Lourenço, 1998 246.

TYPE SPECIES. *Scorpiops anthracinus* Simon, 1887.

DIAGNOSTIC CHARACTERS. This genus is defined by the presence of three pairs of lateral eyes and 10–12 ventral trichobothria on the manus of pedipalps. External trichobothria on the patella of pedipalps number 23–24, and the ventral surface of the patella bears 15–19 trichobothria. Trichobothrium Eb3 on the external surface of the tibia is always situated between trichobothria Dt and Est (Fig. 31).
COMMENTS. The genus *Alloscorpiops* was described by Vachon (1980) as a subgenus and with the change from subfamily to family status was elevated to genus.

Alloscorpiops anthracinus (Simon, 1887)
(Figs 8, 24, 26, Tables 1–3)

Scorpiops anthracinus Simon, 1887 112, Pocock, 1893. 328, Kraepelin, 1899. 180, Pocock, 1900 74, Kraepelin, 1913 161 (in part); Takashima, 1945 98
Scorpiops (*Alloscorpiops*) *anthracinus*. Vachon, 1980 151.
Alloscorpiops anthracinus Kovařík, 1998 141
Scorpiops montanus (in part ?) Kraepelin, 1894 192.

TYPE LOCALITY AND TYPE DEPOSITION. Tavoy; MNHN.

MATERIAL EXAMINED **Myanmar** Tavoy (Tenasserim), 1M1juv A, Mus Calcutta, X.1912, ZMUH

DIAGNOSTIC CHARACTERS. Total length is 48–60.6 mm (holotype and one examined specimen). For the position and distribution of trichobothria on the tibia and patella of pedipalps see Figs 8, 24, and 26. Measurements of the carapace, telson, segments of the metasoma and segments of the pedipalps, and numbers of pectinal teeth are given in Table 1. There are 23–24 external trichobothria (5 eb, 2 esb, 2 em, 8–9 est, 6 et) (Fig. 8) and 16–17 ventral trichobothria (Fig. 26) on the patella [Pocock (1900) and Kraepelin (1913) counted 19 ventral trichobothria]. The ventral surface of the tibia bears 11 trichobothria (Fig. 24) [Pocock (1900) counted 10]. Pectinal teeth number 10–11. The carapace is sparsely and finely granulated, and anteriorly bears four longitudinal keels composed of large granules.

The manus of pedipalps is dorsally covered with fine, sparse granules and bears a central longitudinal keel composed of larger granules. Altogether, the manus bears eight keels

The mesosoma is granulated and bears three median keels. The ventral surface of the seventh mesosomal segment is smooth, without keels.

The first through third metasomal segments have 10 keels, the fourth segment has eight keels, and the fifth segment has seven keels. All the keels are distinctly elevated and composed of granules of nearly equal size. The dorsolateral keels of the first four segments are serrated and each keel posteriorly terminates in a pronounced tooth.
COMMENTS. *Alloscorpiops anthracinus* is based on one specimen for which Simon did not determine the sex. I have not been able to examine the type.
DISTRIBUTION. Myanmar (Simon 1887: 112).

Alloscorpiops lindstroemii (Thorell, 1889)
(Tables 2, 3)

Scorpiops lindstroemii Thorell, 1889 573, Pocock, 1893 328, Pocock, 1900 74, Takashima, 1945 99
Scorpiops (*Alloscorpiops*) *lindstroemi* Vachon, 1980 151
Alloscorpiops lindstroemi Kovařik, 1998 141
Scorpiops montanus (in part) Kraepelin, 1894 192, Kraepelin, 1899 180, Minnocci, 1974 42
Scorpiops anthracinus (in part) Kraepelin, 1913 161
Scorpiops lugubris Thorell, 1889 579 (TL Plapoo in monte Mooleyit, MCSN), Pocock 1893 328 (syn by Pocock 1900 74)

TYPE LOCALITY AND TYPE DEPOSITION Plapoo in monte Mooleyit, MCSN

DIAGNOSTIC CHARACTERS Total length is 68 mm (Thorell 1889 578) The position and distribution of trichobothria on the tibia and patella of pedipalps have not been published Ventral trichobothria on the patella number 15 (Pocock 1900 66), and pectinal teeth number 8 (Thorell 1889 578)
COMMENTS *A lindstroemii* is based on one specimen collected by Mr Fea in Myanmar *Scorpiops lugubris*, based on a 24 mm long juvenile from the same locality (Thorell 1889 583), was regarded by Pocock (1900 74) as a junior synonym of *A lindstroemii*

Kraepelin (1913 161–162) doubted the validity of *A lindstroemii* and thought that it could be a synonym of *A anthracinus* He believed the type of *A lindstroemii* to be a female of *A anthracinus* and their different numbers of pectinal teeth to be only due to sexual dimorphism Unfortunately, I have not been able to examine the type or any other specimens of this species, and the diagnostic characters are therefore based solely on the authors cited The above synonymy thus remains tentative and can be definitely resolved only upon examination of the *A lindstroemii* type
DISTRIBUTION Myanmar (Thorell 1889 579)

Dasyscorpiops Vachon, 1974
(Tables 2, 3)

Dasyscorpiops Vachon, 1974 952, Francke, 1976 82, Stockwell, 1989 120, Sissom, 1990 114 Kovařik, 1998 141, Lourenço, 1998 246

TYPE SPECIES *Dasyscorpiops grandjeani* Vachon, 1974

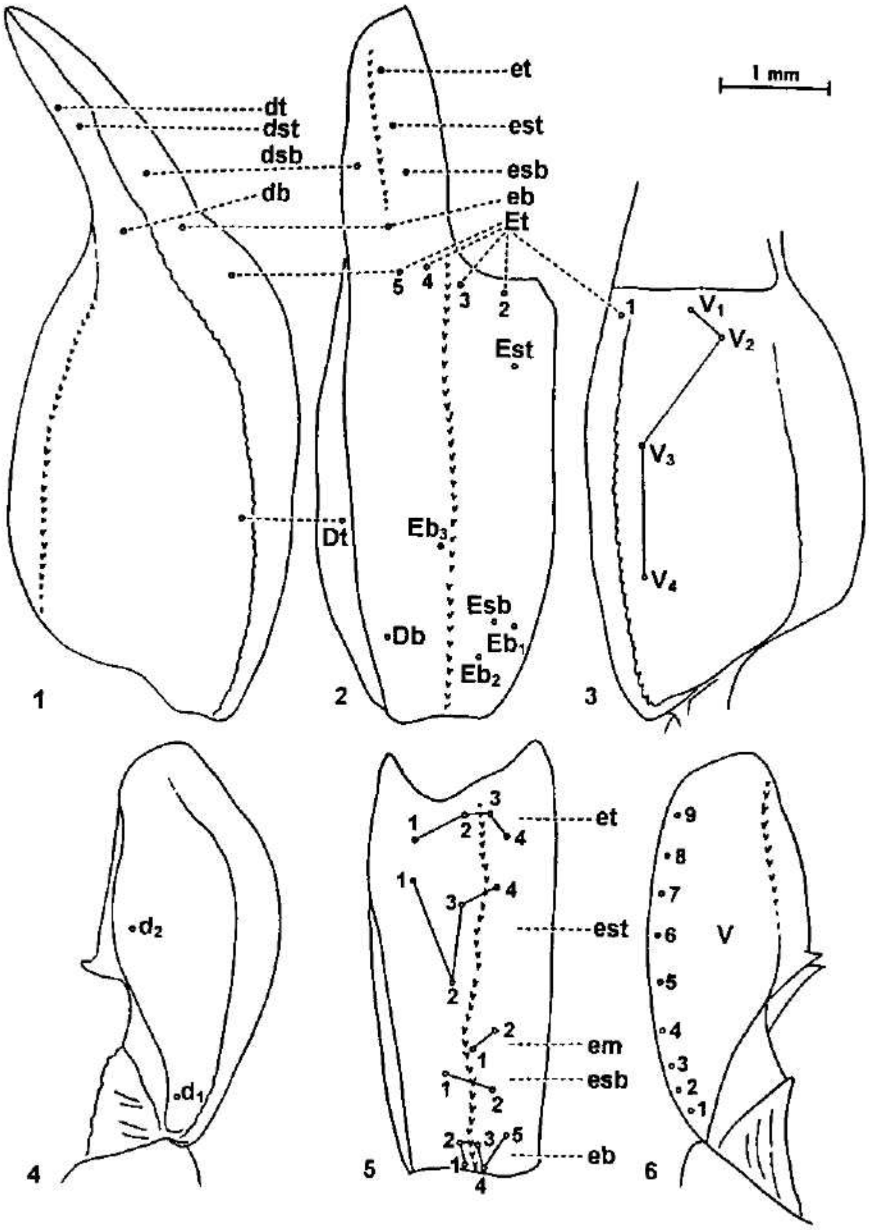
DIAGNOSTIC CHARACTERS This monotypic genus is defined by the presence of three pairs of lateral eyes and 85 trichobothria on the patella of pedipalps, which is a number far greater than in other genera of the family Of these trichobothria, 59 or 60 are situated on the external surface of the patella Other characters are given in the diagnosis of *D grandjeani* below

Dasyscorpiops grandjeani Vachon, 1974
(Tables 2, 3)

Dasyscorpiops grandjeani Vachon, 1974 953, Kovařik, 1998 141, Lourenço, 1998 251

TYPE LOCALITY AND TYPE DEPOSITION Malacca, MNHN

DIAGNOSTIC CHARACTERS Total length of the holotype is 38 mm (Vachon 1974 953) Habitus is shown in Lourenço, 1998 251, fig 12 There are 59–60 external trichobothria and 23 ventral trichobothria on the patella (Vachon 1974 926, figs 142, 147) The chela of pedipalps bears 26 trichobothria, of which four are on the ventral surface Pectinal teeth number 8 and 9
COMMENTS The species is based on one female, No 0731 at MNHN



Figs 1–6 *Scorpiops farkaci* Kovařík, female paratype No 5 In Figs 1–3 the first capital letters denote trichobothria situated on the manus, and the first lower-case letters denote those situated on the fixed finger of pedipalp Figs 4–6 show the distribution of trichobothria on the patella of pedipalp Explanations First letters V, ventral, D, dorsal, E, external Second or second plus third letters b, basal, sb, suprabasal, m, medial, st, subterminal, t terminal Numerals distinguish individual trichobothria of the same classification Designation and description of trichobothria according to Vachon (1974, 1980) Morphological terminology according to Stahnke (1970)

Unfortunately, I have not been able to examine the type or any other specimens of this species, and the diagnostic characters are therefore based solely on the authors cited.
DISTRIBUTION. Malaysia (Vachon 1974: 953).

Neoscorpiops Vachon, 1980
(Figs 9–12, 27, 30, Tables 1–3)

Scorpiops (*Neoscorpiops*) Vachon, 1980. 151; Tikader & Bastawade, 1983: 383, Bastawade, 1997 104
Neoscorpiops: Stockwell, 1989. 120, Sissom, 1990: 114, Kovařík, 1998 141, Lourenço, 1998. 246.

TYPE SPECIES. *Scorpiops montanus satarensis* Pocock, 1900.

DIAGNOSTIC CHARACTERS. This genus is defined by the presence of three pairs of lateral eyes and 22–27 external trichobothria on the patella of pedipalps (Figs 9–12). The ventral surface of the patella bears 12–18 trichobothria (Fig. 27), and the ventral surface of the manus has four (Fig. 3). Trichobothrium Eb3 on the external surface of the tibia is always situated between trichobothria Dt and Db (Fig. 30).
COMMENTS. The genus *Neoscorpiops* was described by Vachon (1980) as a subgenus and with the change from subfamily to family status was elevated to genus.

Neoscorpiops deccanensis (Tikader et Bastawade, 1977)
(Figs 9, 27, 30, Tables 1–3)

Scorpiops deccanensis Tikader et Bastawade, 1977: 141
Scorpiops (*Neoscorpiops*) *deccanensis*: Vachon, 1980 155; Tikader & Bastawade, 1983 383; Tikader, 1987. 34, Bastawade, 1997 104
Neoscorpiops deccanensis: Kovařík, 1998 141

TYPE LOCALITY AND TYPE DEPOSITION. India, Maharashtra, Sinhgarh, 16 km SW of Poona City; NZSI.

MATERIAL EXAMINED **India**. Singahad, Poona, 29.X.1979, 1FA, leg K. Matthews, det D. B. Bastawade, MBCZ.

DIAGNOSTIC CHARACTERS. Total length is 51.6–55 mm. For position and distribution of trichobothria on tibia and patella of pedipalps see Figs 9, 27, and 30. Measurements of the carapace, telson, segments of the metasoma and segments of the pedipalps, and numbers of pectinal teeth are given in Table 1. There are 26–27 external trichobothria (5 eb, 2 esb, 2 em, 10 est, 7–8 et) (Fig. 9) and 15–18 ventral trichobothria on the patella (Fig. 27). Pectinal teeth number 6–7.
COMMENTS. *N. deccanensis* is based on six specimens of both sexes, of which five were collected at the type locality on 25.V. and 19.VI.1976, and one was found in the Kala Caves, north of Poona, Maharashtra, on 18.IX.1976.
DISTRIBUTION. India (Maharashtra) (Tikader & Bastawade 1977: 143).

Neoscorpiops satarensis (Pocock, 1900)
(Figs 10, 11, Tables 1–3)

Scorpiops montanus satarensis Pocock, 1900 71; Takashima, 1945 98
Scorpiops (*Neoscorpiops*) *satarensis*: Vachon, 1980. 155; Tikader & Bastawade, 1983: 388, Bastawade, 1997 104
Neoscorpiops satarensis: Kovařík, 1998 142

TYPE LOCALITY AND TYPE DEPOSITION. India, Mahableshwar, Satára district; BMNH.

Type material examined **India** Mahableshwar, Satára district, 1FA (lectotype), leg Wroughton, BMNH No 1896.6 13 8 15

Further material examined. **India**: Satara dist , Mahableshwar, 1MA, Mus. Calcutta, VIII 1913, ZMUH, Panrel, 6 X 1955, 1FA, FKCP

Diagnostic characters. Total length is 51–60 mm. For position and distribution of trichobothria on the patella of pedipalps see Figs 10–11. Measurements of the carapace, telson, segments of the metasoma and segments of the pedipalps, and numbers of pectinal teeth are given in Table 1. Trichobothria on the external surface of the patella number 22–23 (5 eb, 2 esb, 2 em, 7–8 est, 5–6 et). The positions of trichobothria em, est, and et are variable (Figs 10–11). Ventral trichobothria on the patella number 13–14. Pectinal teeth number 6–7. The carapace is granulated and its posterior and lateral portions are punctate.

The manus of pedipalps dorsally bears equal-sized granules that form a wide longitudinal strip medially and a lattice with smooth facets more laterally.

The mesosoma is sparsely granulated, with one median keel and two symmetrical, smooth surfaces on each mesosomal segment. The ventral surface of the seventh mesosomal segment either bears four poorly developed oblique keels, or is altogether devoid of keels. The first metasomal segment bears 10 or eight keels, and the second through fourth segments bear eight keels. On the second metasomal segment there may also be two lateral keels consisting of several granules. The dorsolateral keels, chiefly of the third and fourth segments, posteriorly terminate in a pronounced tooth.

Comments. *N. satarensis* is based on one male and one female. I examined the female and designated it as the lectotype. This female was examined in 1978 also by Vachon, who assigned it No. VA 2392-1. However, he incorrectly regarded this specimen as the holotype.

Distribution. India (Maharashtra) (Pocock 1900: 73).

Neoscorpiops tenuicauda (Pocock, 1894)

(Fig. 12, Tables 1–3)

Scorpiops tenuicauda Pocock, 1894. 77, Kraepelin, 1899: 181.
Scorpiops montanus tenuicauda Pocock, 1900: 72; Fage, 1933: 30; Takashima, 1945 98.
Scorpiops (Neoscorpiops) tenuicauda· Vachon, 1980. 155; Tikader & Bastawade, 1983. 396; Bastawade, 1997 104
Neoscorpiops tenuicauda Kovařik, 1998· 142.

Type locality and type deposition. India, Deccan; BMNH.

Type material examined **India**· Deccan, 1MA (lectotype), BMNH No 1897 9 17 42 43, rev M Vachon (No VA 2393–1)

Diagnostic characters. Total length is 36–48 mm. For position and distribution of trichobothria on the patella of pedipalps see Fig. 12. Measurements of the carapace, telson, segments of the metasoma and segments of the pedipalps, and numbers of pectinal teeth are given in Table 1. There are 25 trichobothria on the external surface of the patella (5 eb, 2 esb, 2 em, 9 est, 7 et) (Fig. 12). Ventral trichobothria on the patella of the examined specimen number 15, however Pocock (1894, 1900) counted 12–13. Pectinal teeth number 6–7. The carapace is densely and very finely granulated, with larger smooth areas only behind the lateral eyes.

The manus of pedipalps is dorsally covered by granules that form a wide longitudinal strip in the center and a lattice with relatively large smooth facets in the remaining area.

The mesosoma is sparsely granulated and bears one median keel. The ventral surface of the seventh mesosomal segment is smooth, without keels. The first metasomal segment bears 10 keels, the second through fourth segments bear eight keels, and the fifth segment bears seven keels. The

Tab 1 Measurements (in millimetres) of scorpiopid species Explanatory notes PT = numbers of teeth on both sides separated by a colon, T = total I = first metasomal segment, tel = telson, ma = manus, fin = movable finger, L = length, W = width, patella width does not include thorns on internal surface

	total	carapace		metasoma												pedipalp							PT
				T	I		II		III		IV		V		tel	femur		patella		tibia	ma	fin	
	L	L	W	L	L	W	L	W	L	W	L	W	L	W	L	L	W	L	W	L	W	L	
Alloscorpiops anthracinus																							
M, ZMUH	60 6	9 2	8 4	29 3	2 7	3 3	2 9	2 9	3 2	2 7	3 9	2 5	7 7	2 4	8 8	8 0	3 1	7 1	3 0	16 8	4 3	9 5	11 11
Neoscorpiops deccanensis																							
F, MBCZ	51 6	7 3	8 0	21 6	2 5	2 4	2 5	2 0	2 7	1 9	3 2	1 7	5 0	1 7	5 6	8 0	3 0	7 1	2 9	14 7	4 5	7 3	6 6
N satarensis																							
M (im), ZMUH	42 5	6 7	6 8	20 3	2 0	2 2	2 2	1 9	2 5	1 9	2 9	1 8	4 9	1 7	5 5	6 5	2 9	6 4	2 9	13 2	4 3	6 8	7 7
F, LT, BMNH	59 8	8 0	8 9	22 1	2 1	2 7	2 5	2 3	2 8	2 1	3 3	1 9	5 5	1 9	5 9	8 2	3 5	8 0	3 7	16 0	5 7	8 1	7 7
N tenuicauda																							
M, LT, BMNH	47 9	7 6	7 6	23 6	2 3	2 4	2 6	2 2	3 0	2 1	3 5	2 0	5 4	1 9	6 5	8 4	3 1	7 3	3 1	15 5	4 7	7 5	7 7
Parascorpiops montanus																							
F, FKCP	40 3	5 9	5 6	20 7	2 1	1 9	2 4	1 6	2 8	1 5	3 2	1 5	4 8	1 5	5 2	5 4	2 3	5 4	2 6	11 8	4 2	6 0	6 6
Scorpiops asthenurus																							
M, HT, BMNH	35 8	5 5	5 6	16 8	1 7	1 9	1 8	1 8	2 0	1 7	2 4	1 5	4 0	1 5	4 6	5 8	2 0	5 5	2 4	10 9	3 4	5 7	6 6
F, ZMUH	45 0	7 3	7 6	21 4	2 2	2 4	2 3	2 1	2 5	2 0	2 9	1 8	5 4	1 8	6 0	8 0	2 5	6 8	2 7	15 4	3 9	7 4	6 6
S binghami																							
M, HT, BMNH	52 8	7 8	7 5	25 8	2 5	3 1	2 7	2 9	2 8	2 7	3 6	2 5	6 5	2 5	7 4	8 0	3 0	7 5	3 1	15 8	4 4	7 7	9 9
F, ZMUH	50 0	7 1	7 0	21 7	2 1	2 6	2 2	2 3	2 5	2 1	3 0	2 1	5 2	2 0	6 3	6 6	2 4	6 3	2 6	13 1	3 9	7 1	7 6
S braunwalderi **sp. n.**																							
M, HT, FKCP	40 5	5 4	5 7	20 9	2 2	2 9	2 6	2 5	2 9	2 4	3 2	2 2	4 7	1 9	4 7	5 0	2 1	5 5	2 3	9 2	3 9	4 7	6 6
S dastychi **sp. n.**																							
M, HT, ZMUH	38 8	5 2	5 2	21 0	2 0	2 7	2 5	2 5	2 8	2 4	3 2	2 3	4 9	2 0	5 0	5 3	2 1	6 0	2 2	10,4	3 4	5 0	6 6
F, AT, ZMUH	35 5	5 0	5 1	19 0	2 0	2 8	2 4	2 4	2 5	2 3	2 9	2 2	4 6	1 9	4 4	4 1	1 9	4 8	2 1	8 7	3 6	4 0	6 6
S farkaci																							
M, HT, FKCP	24 8	4 3	4 5	13 8	1 4	2 0	1 8	1 9	2 0	1 8	2 1	1 7	3 7	1 6	3 8	4 2	1 8	4 7	1 9	8 0	2 7	3 9	7 7
M, PT No 2, FKCP	32 5	4 6	4 7	15 3	1 5	2 1	1 8	2 0	2 1	1 9	2 4	1 8	4 0	1 7	4 2	4 5	1 9	4 8	2 0	8 0	2 9	3 9	7 7
F, PT No 7, FKCP	36 6	4 6	4 8	16 0	1 5	2 1	1 8	2 0	2 0	1 9	2 3	1 9	3 8	1 7	4 0	4 0	1 7	4 3	2 0	7 9	3 2	4 0	6 6
S feti **sp. n.**																							
M, HT, ZMUH	54 2	7 3	7 2	30 7	2 8	3 5	3 5	3 0	4 0	2 8	4 5	2 7	7 3	2 6	8 0	7 0	2 6	7 0	2 9	14 3	4 8	7 2	8 8
F, AT, ZMUH	51 7	7 2	7 1	26 5	2 7	3 3	3 1	2 9	3 4	2 8	3 6	2 6	6 3	2 4	6 5	6 1	2 4	6 0	2 8	13 0	4 4	7 0	7 7

S hardwickii																							
M, LT *S insculptus*, BMNH	36 0	4 6	4 7	19 0	2 1	2 4	2 4	2 1	2 6	2 1	2 7	2 0	4 5	1 8	4 4	3 2	1 6	3 7	1 6	7 5	4 0	4 3	6 6
F, FKCP	58 6	7 3	8 2	28 9	2 9	3 6	3 5	3 2	3 9	3 0	4 4	2 8	7 2	2 4	6 9	5 6	2 5	6 2	3 0	12 5	5 5	6 7	6 6
S irenae																							
F, HT, FKCP	51 3	7 3	7 8	25 2	2 5	3 1	3 0	2 6	3 3	2 2	3 8	2 2	6 2	2 2	6 4	7 5	2 5	7 0	2 7	14 1	4 5	7 5	6 5
S jendeki **stat. n**																							
M, FKCP	32 2	4 5	4 8	19 1	1 9	2 4	2 1	2 1	2 3	2 0	2 8	1 9	4 5	1 9	4 9	3 5	1 5	3 7	1 7	7 5	3 4	4 0	5 5
F, HT, FKCP	42 1	5 1	5 9	20 1	2 1	2 6	2 5	2 3	2 6	2 1	3 1	2 1	5 4	2 0	4 8	4 2	1 6	4 4	1 8	8 3	3 8	4 6	4 4
S kaftani																							
F, HT, FKCP	31 5	5 5	6 0	15 5	1 6	2 0	1 8	1 6	2 0	1 5	2 4	1 5	4 0	1 3	3 9	6 1	2 0	5 3	2 3	11 9	2 7	5 8	6 6
S leptochirus																							
M, HT, BMNH	44 9	6 3	6 0	26 4	2 4	2 9	2 9	2 8	3 2	2 7	3 8	2 5	6 2	2 4	6 3	6 5	2 0	6 7	2 6	13 0	3 3	6 4	7 7
F, FKCP	48 8	6 6	6 5	22 9	2 1	3 0	2 6	2 7	2 9	2 4	3 5	2 3	5 5	2 2	5 9	5 6	2 2	5 7	2 5	12 1	3 9	6 0	7 7
S lindbergi																							
M, HT *S kraepelini*, ZMUH	35 4	5 4	5 4	17 3	1 7	2 0	2 0	1 7	2 1	1 6	2 5	1 5	4 1	1 4	4 8	4 6	1 9	4 6	2 1	10 1	3 6	5 0	9 7
F, FKCP	39 1	5 4	5 4	18 2	1 7	1 8	2 0	1 7	2 1	1 6	2 6	1 6	4 6	1 6	4 7	5 1	2 1	4 8	2 3	10 4	3 9	5 3	7 7
S longimanus																							
M, ZMUH	52 4	7 3	7 1	25 4	2 5	3 0	2 8	2 8	2 9	2 6	3 3	2 4	6 5	2 3	7 2	8 2	3 1	7 9	3 1	15 5	4 7	7 3	9 9
F, ZMUH	56 1	7 8	7 5	25 8	2 4	3 0	2 7	2 7	2 9	2 5	3 4	2 2	6 5	2 2	7 3	7 2	2 8	7 1	2 9	14 5	4 2	7 6	7 7
F, FKCP	68 2	9 6	9 5	31 2	2 9	3 5	3 2	3 0	3 5	2 7	4 1	2 6	7 2	2 4	8 4	9 5	3 7	8 4	3 9	18 1	5 4	9 6	7 7
S margerisonae **sp. n.**																							
M, HT, FKCP	51 0	7 1	7 3	23 5	2 3	2 8	2 5	2 5	2 8	2 2	3 5	2 2	5 8	2 2	6 1	5 9	2 6	6 1	2 9	12 9	5 7	6 7	12 13
S montanus																							
M, FKCP	56 8	8 6	8 0	26 2	2 7	2 7	2 8	2 4	3 2	2 3	3 9	2 1	6 2	2 0	7 2	10	3 4	8 4	3 8	17 5	5 0	8 4	8 8
F, MZUF	53 5	8 4	8 4	24 2	2 4	2 5	2 5	2 3	2 9	2 1	3 4	1 9	5 2	1 8	6 2	8 7	3 4	7 6	3 5	15 8	4 9	7 8	7 7
S petersii																							
M, LT, BMNH	69 3	8 8	8 0	34 7	3 5	3 5	4 1	3 0	4 4	2 8	5 0	2 6	8 2	2 3	8 7	7 2	3 3	7 2	3 4	15,1	5 8	7 5	5 5
F, NHMB	67 0	8 3	7 7	32 0	3 2	3 6	3 6	3 4	4 1	3 3	4 4	3 0	7 1	2 8	7 5	6 6	3 0	7 0	3 1	13 8	5 5	8 1	7 7
S problematicus **sp. n.**																							
M, HT, FKCP	45 8	7 1	7 3	23 6	2 2	2 8	2 6	2 6	2 7	2 4	3 3	2 1	5 7	2 0	6 4	7 0	2 7	6 5	2 9	13 9	4 3	7 0	8 8
F, AT, FKCP	46 7	8 1	8 5	24 4	2 4	3 1	2 5	2 6	2 9	2 4	3 7	2 3	6 3	2 2	6 5	7 4	3 1	7 0	3 4	15 2	5 0	7 9	7 7
S sejnai **sp. n.**																							
M, HT, FKCP	42 6	6 2	6 5	21 1	2 0	2 2	2 3	2 0	2 7	1 9	3 2	1 9	5 1	1 8	5 5	6 7	2 5	6 5	2 7	12 4	4 5	6 4	6 6
S tibetanus																							
M, HT, BMNH	60 4	7 5	7 5	34 5	3 6	3 9	4 3	3 5	4 7	3 4	5 2	3 2	8 1	2 9	7 6	5 3	2 4	5 8	2 5	11 9	5 9	6 8	8 7
F, FKCP	53 2	7 5	7 7	27 2	2 7	3 1	3 2	2 7	3 6	2 7	4 2	2 5	6 7	2 4	6 7	5 4	2 4	5 8	2 5	12 5	5 1	7 0	8 7

dorsolateral keels, mainly those of the third and fourth segments, posteriorly terminate in a pronounced tooth.
COMMENTS. Pocock (1894) did not select a holotype, and I therefore designate the examined male from the type series as the lectotype. This male was examined also by Vachon, who assigned it No. VA 2393-1.
DISTRIBUTION. India (Maharashtra) (Pocock 1894: 77).

Parascorpiops Banks, 1928
(Figs 13, 23, Tables 1–3)

Parascorpiops Banks, 1928 505, Werner, 1934 283, Stahnke, 1974 124; Stockwell, 1989. 120; Sissom, 1990 114, Kovařík, 1998 142, Lourenço, 1998: 246

TYPE SPECIES. *Parascorpiops montana* Banks, 1928.

DIAGNOSTIC CHARACTERS. This monotypic genus is unequivocally defined by only two pairs of lateral eyes, as all other scorpiopid genera have three pairs of lateral eyes. Other characters are given in the diagnosis of *P montanus* below.

Parascorpiops montanus Banks, 1928
(Figs 13, 23, Tables 1–3)

Parascorpiops montana Banks, 1928: 506, Takashima, 1945. 97; Stahnke, 1974 124, Francke, 1976 75, Goyfon, 1993 246, Kovařík, 1994 198, Kovařík, 1998· 142.
Parascorpiops montanus Werner, 1934 283

TYPE LOCALITY AND TYPE DEPOSITION. Sarawak, Mt. Poi; MCZC.

MATERIAL EXAMINED **Malaysia**: Borneo, Sarawak, Matang, cca 20 km W of Kuching, 1FA, 1870, FKCP

DIAGNOSTIC CHARACTERS. Total length is 40.3–55.1 mm. The male has fingers of pedipalps flexed (Francke 1976: 81, fig. 11), whereas in the examined female they are straight. For position and distribution of trichobothria on the tibia and patella of pedipalps see Figs 13, 23, and Francke (1976: 81, figs 7–12). Measurements of the carapace, telson, segments of the metasoma and segments of the pedipalps, and numbers of pectinal teeth are given in Table 1. There are 17 external trichobothria *(5 eb, 2 esb, 2 em, 4 est, 4 et) (Fig. 13) and 10–11 ventral trichobothria on the patella. Pectinal* teeth number 6.

The carapace is sparsely and finely granulated, with somewhat larger granules only anteriorly. The mesosoma bears one median keel. The ventral surface of the seventh mesosomal segment bears four keels.
COMMENTS. This species is based on 11 specimens of both sexes, all of which were examined by Francke (1976) who designated one adult male as the lectotype. The FKCP female has 11 ventral trichobothria on the patella of pedipalps, whereas all the types have 10 ventral trichobothria (Francke 1976: 80, fig. 9); Banks (1928) regarded this character as diagnostic of the genus *Parascorpiops*.
DISTRIBUTION. Malaysia (Sarawak) (Banks 1928: 506).

Scorpiops Peters, 1862
(Figs 1–7, 14–22, 25, 28, 29, 31–72, Tables 1–3)

Scorpiops Peters, 1862. 510, Kraepelin, 1899: 179 (in part); Stahnke, 1974· 124; Vachon, 1980. 143, Stockwell, 1989: 120; Sissom, 1990: 114; Kovařík, 1998: 142; Lourenço, 1998 246

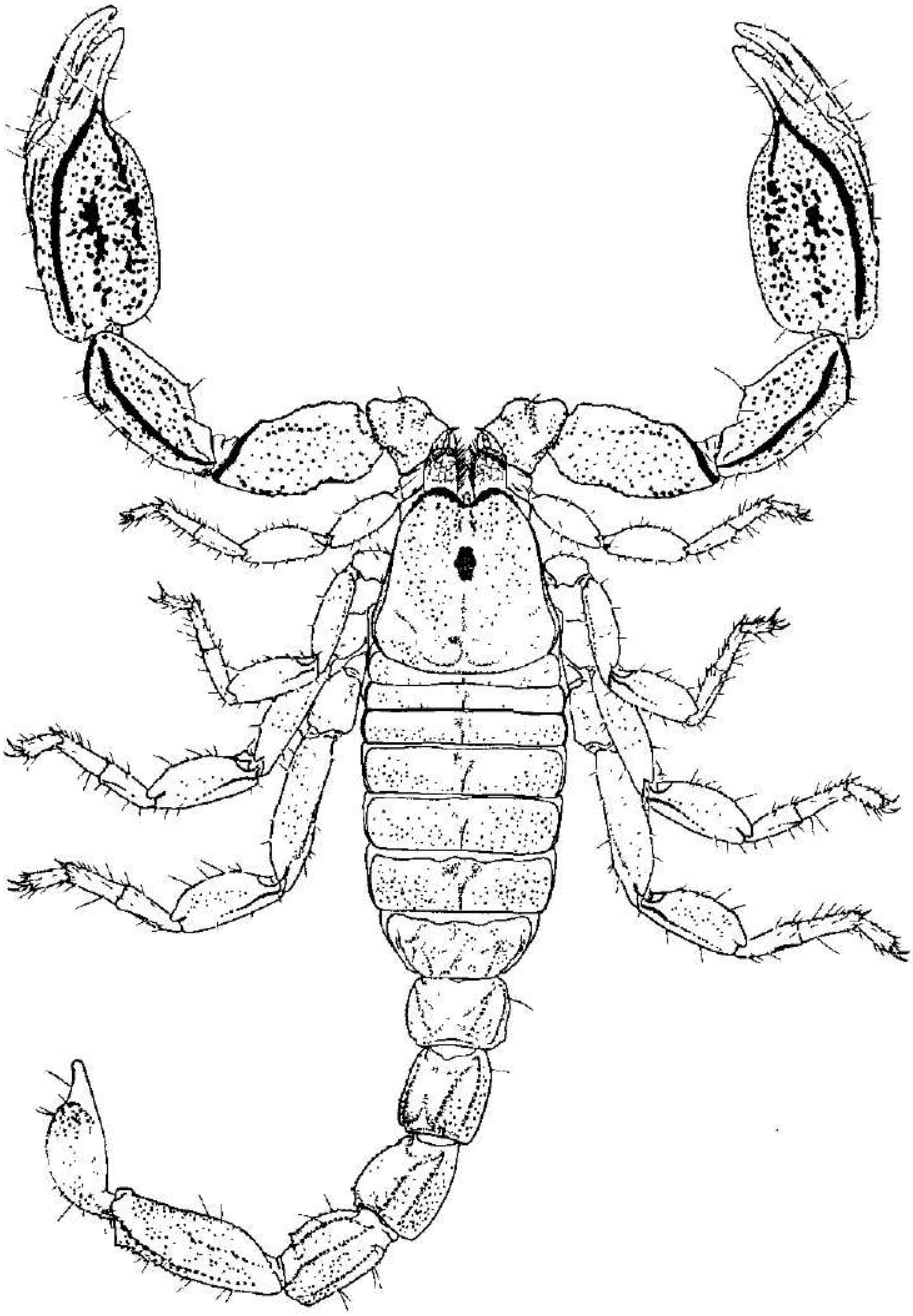


Fig. 7. *Scorpiops braunwalderi* sp. n., male holotype, dorsal aspect.

Scorpiops (*Euscorpiops*) Vachon, 1980 155 (TS. *Scorpiops asthenurus* Pocock, 1900), Tikader & Bastawade, 1983: 452; Bastawade, 1997 104, **syn. n.**
Euscorpiops. Stockwell, 1989 120, Sissom, 1990 114, Kovařík, 1998. 141; Lourenço, 1998 246

TYPE SPECIES. *Scorpio hardwickii* Gervais, 1843.

DIAGNOSTIC CHARACTERS. This genus is defined by the presence of three pairs of lateral eyes and 17–21 external trichobothria on patella of pedipalps (Figs 5, 14–22). The ventral surface of the patella bears 6–18 trichobothria (Figs 6, 28–29). The number of trichobothria on the ventral surface of the manus is 3 or 4 (Figs 3, 25). Trichobothrium Eb3 on the external surface of the tibia is situated between trichobothria Db and Dt (Figs 2, 45) or between Dt and Est (Fig. 31).

The first metasomal segment bears 10 keels, the second through fourth segments bear eight keels, and the fifth segment bears seven keels and only one keel on the ventral surface A dorsolateral keel on the fifth metasomal segment is always present.

All species are colored from dark red through brown to black, only *S lindbergi* is uniformly yellow.

COMMENTS. The genus *Scorpiops* formerly included also all the species now placed in the genera *Alloscorpiops*, *Euscorpiops*, and *Neoscorpiops*. These genera were described by Vachon (1980) as subgenera, and with elevation of the Scorpiopsinae to family status became genera. The subgenus-to-genus change was done as a formality, without thorough studies of the species.

The great similarity of the species of *Scorpiops* and *Euscorpiops* caused arbitrary decisions about their affiliation (Tikader & Bastawade 1983: 453, Lourenço 1998: 246), and has led me to synonymize the genus *Euscorpiops* for reasons further explained below.

DISCUSSION Examination of a majority of *Scorpiops* and *Euscorpiops* species has convinced me that they should not be split into two genera defined merely on the difference of one external trichobothrium on the patella. Species with 17 trichobothria were placed in *Scorpiops* and those with 18–21 trichobothria in *Euscorpiops*, although the holotype of *S. kraepelini* has 17 trichobothria on one patella of pedipalps and 18 on the other (see below).

In the genus *Scorpiops* there are three interrelated groups: *S bhutanensis* (described as *Euscorpiops*), *S. braunwalderi* sp. n., *S. dastychi* sp. n. , *S farkaci*, *S. feti* stat. n., *S. leptochirus*, and *S oligotrichus* (*S. leptochirus* species group); *S. hardwickii*, *S. jendeki* comb. n., *S. margerisonae* sp. n , *S rohtangensis*, and *S. tibetanus* (*S hardwickii* species group); and *S. irenae* and *S petersii* (*S petersii* species group). *S. montanus* differs substantially from these groups, e. g. in the presence of up to 18 ventral trichobothria on the patella of pedipalps (6–10 in other species) and in the position of trichobothrium Eb3 on the external surface of the tibia between trichobothria Dt and Est. Also *S pachmarhicus* appears to defy assignment to one of the above species groups.

The genus *Euscorpiops* was composed of species very similar to each other, but included also *E. lindbergi* that substantially differs from them in e. g. the shape of the manus of pedipalps and the

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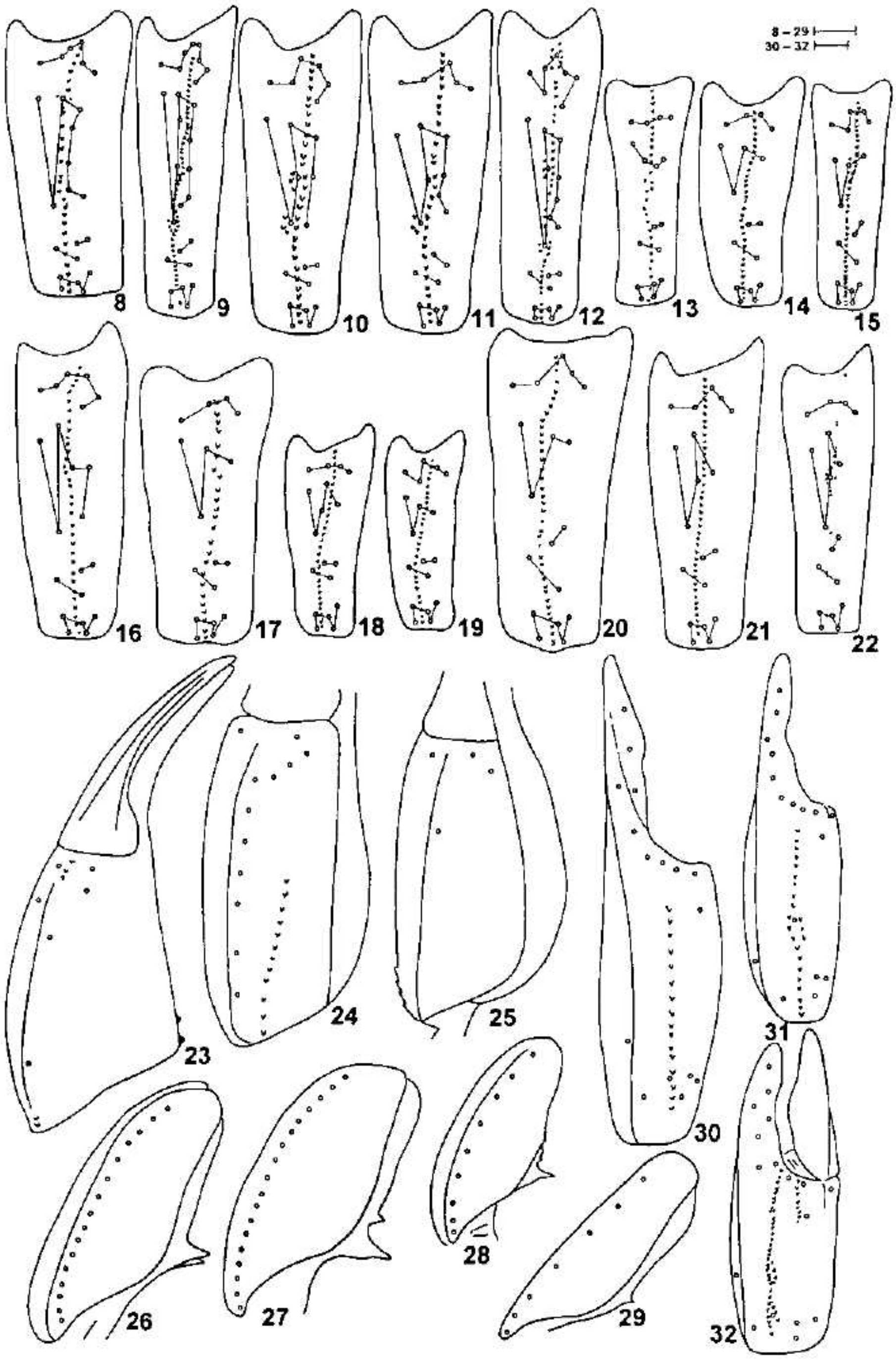
Figs 8–32 8–22 Patella of pedipalp, external view 23–25 Tibia of pedipalp, ventral view. 26–28. Patella of pedipalp, ventral view 30–32 Tibia of pedipalp, external view. 8, 24, 26 *Alloscorpiops anthracinus* (Simon), ZMUH male 9, 27, 30 *Neoscorpiops deccanensis* (Tikader et Bastawade), MBCZ female 10. *N satarensis* (Pocock), female lectotype 11 *N satarensis* (Pocock), ZMUH female 12 *N tenuicauda* (Pocock), female lectotype 13, 23 *Parascorpiops montanus* Banks, FKCP female 14 *Scorpiops hardwickii* (Gervais), BMNH male 15, 28, 31 *S. asthenurus* Pocock, male holotype 16 *S binghamii* Pocock, male holotype. 17 *S feti* sp n., male holotype 18, 19 *S lindbergi* Vachon 18 FKCP female. 19 *S kraepelini* Lourenço, female allotype 20 *S longimanus* Pocock, ZMUH female 21. *S. problematicus* sp n., female allotype 22 *S sejnai* sp n , male holotype 25 *S irenae* Kovařík, female holotype. 29 *S. dastychi* sp n , male holotype 32 *S braunwalderi* sp n., male holotype


8 – 29
30 – 32

Tab. 2. Geographical distribution of scorpiopid genera and species. Abbreviations: AF – Afghanistan, BA – Bangladesh, BH – Bhutan, CH – China, IN – India, LA – Laos, MA – Malaysia, MY – Myanmar, NE – Nepal, PA – Pakistan, TH – Thailand, VI – Vietnam

	AF	BA	BH	CH	IN	LA	MA	MY	NE	PA	TH	VI
Alloscorpiops	–	–	–	–	–	–	–	x	–	–	–	–
A. anthracinus	–	–	–	–	–	–	–	x	–	–	–	–
A. lindstroemii	–	–	–	–	–	–	–	x	–	–	–	–
Dasyscorpiops grandjeani	–	–	–	–	–	–	x	–	–	–	–	–
Neoscorpiops	–	–	–	–	x	–	–	–	–	–	–	–
N. deccanensis	–	–	–	–	x	–	–	–	–	–	–	–
N. satarensis	–	–	–	–	x	–	–	–	–	–	–	–
N. tenuicauda	–	–	–	–	x	–	–	–	–	–	–	–
Parascorpiops montanus	–	–	–	–	–	–	x	–	–	–	–	–
Scorpiops	x	x	x	x	x	x	–	x	x	x	x	x
S. asthenurus	–	–	x	–	x	–	–	–	–	–	–	–
S. bhutanensis	–	–	x	–	–	–	–	–	–	–	–	–
S. binghamii	–	–	–	–	–	–	–	x	–	–	x	–
S. braunwalderi **sp. n.**	–	–	–	–	x	–	–	–	–	–	–	–
S. dastychi **sp. n.**	–	–	–	–	x	–	–	–	–	–	–	–
S. farkaci	–	–	–	–	–	–	–	–	–	–	x	–
S. jeli **sp. n.**	–	–	–	–	x	–	–	–	–	–	–	–
S. hardwickii	–	–	–	x	x	–	–	–	x	x	–	–
S. irenae	–	–	–	–	–	–	–	–	x	–	–	–
S. jendeki **stat. n.**	–	–	–	x	–	–	–	–	–	–	–	–
S. kaftani	–	–	–	–	–	–	–	–	–	–	–	x
S. leptochirus	–	x	–	–	x	–	–	–	–	–	–	–
S. lindbergi	x	–	–	–	–	–	–	–	–	x	–	–
S. longimanus	–	x	–	–	x	–	–	x	–	–	–	–
S. margerisonae **sp. n.**	–	–	–	x	–	–	–	–	–	–	–	–
S. montanus	–	–	–	–	x	–	–	–	–	x	–	–
S. oligotrichus	–	–	–	–	–	x	–	–	–	–	–	x
S. pachmarhicus	–	–	–	–	x	–	–	–	–	–	–	–
S. petersii	–	–	x	–	x	–	–	–	–	x	–	–
S. problematicus **sp. n.**	–	–	–	–	–	–	–	–	–	–	x	–
S. rohtangensis	–	–	–	–	x	–	–	–	–	–	–	–
S. sejnai **sp. n.**	–	–	–	–	–	–	–	–	–	–	–	x
S. tibetanus	–	–	–	x	–	–	–	–	–	–	–	–

position of trichobothrium Eb3 on the external surface of the tibia, situated between trichobothria Dt and Db. It is even possible to say that the *Scorpiops leptochirus* species group, and namely *S. montanus*, is more closely related to the species of *Euscorpiops* then is *E. lindbergi*, which in contrast appears to be closer to the *S. hardwickii* species group. This is also evidenced by *Scorpiops kraepelini* Lourenço, 1998, which I believe to be a synonym of *Euscorpiops lindbergi*. The close relationship of most species of *Euscorpiops* and the *Scorpiops leptochirus* species group is obscured only by different sexual dimorphism, which in much of the *Scorpiops leptochirus* species group concerns the shape of the manus of pedipalps.

Since the number of trichobothria on the patella of pedipalps frequently varies within a species, the fact that one less trichobothrium can cause *montanus* to be placed in *Scorpiops* and one more trichobothrium can cause *lindbergi* to be placed in *Euscorpiops* convinces me that the genus *Euscorpiops* as defined by Vachon (1980: 155) is invalid.

Scorpiops asthenurus Pocock, 1900

(Figs 15, 28, 31, Tables 1–3)

Scorpiops asthenurus Pocock, 1900 73, Kraepelin, 1913 160, Takashima, 1945 99; Minnocci, 1974 42
Scorpiops (Euscorpiops) asthenurus Vachon, 1980, 155, Tikader & Bastawade, 1983 458, Bastawade, 1985 261
Euscorpiops asthenurus Kovařík, 1998, 141

TYPE LOCALITY AND TYPE DEPOSITION. Kalimpong near Darjiling; BMNH.

TYPE MATERIAL EXAMINED **India** Kalimpong, Darjiling, 1MA (holotype), leg S. Stebbing, BMNH No. 1896 9 26 83
FURTHER MATERIAL EXAMINED **Bhutan** 5 VIII 1901, 1MA, ZMUH No 568 **India**. Darjeeling, 1FA, Mus Calcutta, VIII 1913, ZMUH

DIAGNOSTIC CHARACTERS. Total length is 35.9–45 mm. The male has fingers of pedipalps strongly flexed, whereas in the female they are flexed only slightly. For position and distribution of trichobothria on the tibia and patella of pedipalps see Figs 15, 28, and 31, and Vachon (1980, figs 26–32). Measurements of the carapace, telson, segments of the metasoma and segments of the pedipalps, and numbers of pectinal teeth are given in Table 1. There are 18 external trichobothria (5 eb, 2 esb, 2 em, 4 est, 5 et) (Fig. 15) and 8–9 ventral trichobothria on the patella (Fig. 28). Pectinal teeth number 5–6 in the examined specimens. Kraepelin (1913) gave 7 pectinal teeth for the male and 5–6 for the female. The carapace bears large, sparse granules. Still larger granules form a keel behind the lateral eyes.

The manus of pedipalps dorsally bears fine, sparse granules, whose size slightly increases only in the central part.

The mesosoma is sparsely granulated, chiefly in the posterior half of each segment, and bears one inconspicuous median keel. The seventh mesosomal segment is ventrally smooth, with two inconspicuous smooth keels. All keels on the metasomal segments are composed of equidimensional granules of nearly equal size. The dorsolateral keels of the first four segments posteriorly terminate in a pronounced tooth.

COMMENTS. *Scorpiops asthenurus* was based on one male collected by Stebbing. In 1978 Vachon examined the type and assigned it No. VA 2399.

DISTRIBUTION. Bhutan (new record), India (Assam, Arunachal Pradesh, Sikkim, West Bengal) (Pocock 1900: 73, Tikader & Bastawade 1983: 458, Vachon 1980: 155).

Scorpiops bhutanensis Tikader et Bastawade, 1983

(Tables 2, 3)

Scorpiops (Euscorpiops) bhutanensis Tikader & Bastawade, 1983 453, Kovařík, 1993: 113
Euscorpiops bhutanensis Kovařík, 1998: 141

TYPE LOCALITY AND TYPE DEPOSITION. Eastern Bhutan, Gomchu; NZSI.

DIAGNOSTIC CHARACTERS. Total length of the male holotype is 49.5 mm (Tikader & Bastawade 1983: 453). Tikader & Bastawade (1983) show the position and distribution of trichobothria on the tibia and patella of pedipalps in figs 1255–1260, habitus in fig. 1247, seven or eight ventral trichobothria on the patella in fig. 1256 and on p. 452, 17 external trichobothria on the patella (5eb, 2esb, 2em, 4est, 4et) in fig. 1255, and seven pectinal teeth on p. 457. The species is best characterized by a very long and narrow manus of pedipalps (Tikader & Bastawade 1983: 454, fig. 1247).

COMMENTS. This species is based on a single male obtained by B. Biswas on 9.IV.1966 (Tikader & Bastawade 1983: 458) and deposited at NZSI. Tikader & Bastawade (1983: 453) named it *S.* (*Euscor-*

piops) *bhutanensis*, because they considered the trichobothrium est3 on the external surface of the patella to be one of the et trichobothria. This led them to conclude that the species has five et trichobothria, and, notwithstanding the fact that the total number of trichobothria is 17, they placed the species in the subgenus *Euscorpiops*, which is distinguished from *Scorpiops* by having 18–20 trichobothria on the external surface of the patella. They differentiated *S. bhutanensis* from other species of *Euscorpiops* by having only three est trichobothria (Tikader & Bastawade 1983: 452).

Unfortunately, I have not been able to examine the type or any other specimens of this species, and the diagnostic characters are therefore based solely on Tikader & Bastawade (1983).

DISTRIBUTION. Bhutan (Tikader & Bastawade 1983: 458).

Scorpiops binghamii Pocock, 1893

(Fig. 16, Tables 1–3)

Scorpiops binghamii Pocock, 1893: 327; Pocock, 1900: 74, Henderson, 1913: 133, Takashima, 1945: 99.
Scorpiops (*Euscorpiops*) *binghamii* Tikader & Bastawade, 1983: 470, Kovařík, 1993: 113; Kovařík, 1995: 199
Euscorpiops binghamii Kovařík, 1998: 142
Scorpiops longimanus binghami. Kraepelin, 1913: 161
? *Scorpiops* (*Euscorpiops*) *longimanus benghamii*. Vachon, 1980: 155.
? *Scorpiops montanus* (in part) Kraepelin, 1894: 192, Kraepelin, 1899: 180, Minnocci, 1974: 42

TYPE LOCALITY AND TYPE DEPOSITION. Central Tenasserim; BMNH.

TYPE MATERIAL EXAMINED. **Myanmar**: Burma, Central Tenasserim, 1MA (holotype), leg. Oates & Bingham, BMNH No. 1893.1.11.63–64

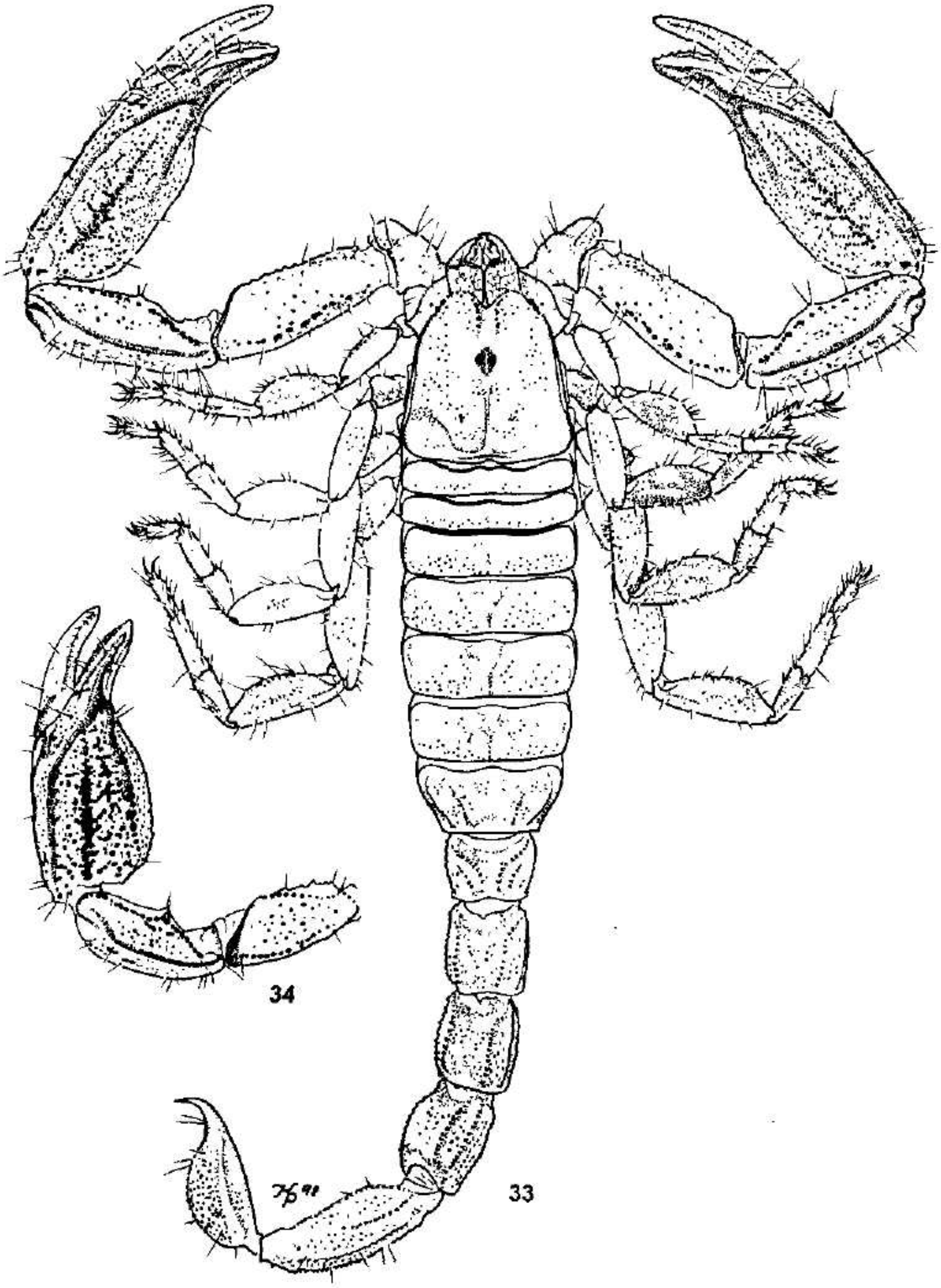
FURTHER MATERIAL EXAMINED. **Myanmar**: Carin Hills, 900–1000 m, viaggio in Birmania, 20.X.1896, 1MFA, leg. L. Fea, ZMUH No. 1565. **Thailand**: NW, Mae Hong Son distr., Nupa-ah, 1FE, 7.–9.VI.1992, leg. J. Strnad, FKCP

DIAGNOSTIC CHARACTERS. Total length is 50–65 mm. In contrast to the female, the male has fingers of pedipalps flexed and has a larger pecten. For the position and distribution of trichobothria on the patella of pedipalps see Fig. 16. Measurements of the carapace, telson, segments of the metasoma and segments of the pedipalps, and numbers of pectinal teeth are given in Table 1. Trichobothria on the external surface of the patella number 20–21 (5 eb, 2 esb, 2 em, 6 est, 5–6 et) (Fig. 16). Ventral trichobothria on the patella number 12–13, however Pocock (1900) counted 14–15 and Kraepelin (1913) 11–15. Pectinal teeth number 6–9. The carapace is finely granulated. There is a keel composed of larger granules behind the lateral eyes.

The manus of pedipalps dorsally bears fine granules of equal size, which are more closely spaced in the center and elsewhere form a lattice with smooth facets.

The mesosoma is sparsely granulated, especially in the posterior half of each segment, and bears one inconspicuous median keel. The ventral surface of the seventh mesosomal segment bears four conspicuous keels. The first metasomal segment bears 10 keels. The second through fourth segments bear eight keels and two more may be weakly indicated. All metasomal keels are composed of equidimensional and nearly equal-sized granules. The dorsolateral keels of the first four segments posteriorly terminate in a pronounced tooth.

COMMENTS. *Scorpiops binghamii* is based on one male collected by Bingham and in 1980 examined by Vachon, who assigned it No. VA 2492. Kraepelin (1913) and Vachon (1974, 1980) regarded this species as a subspecies of *S. longimanus*. Although *S. binghamii* and *S. longimanus* are very similar, they can nevertheless be differentiated on the number and distribution of trichobothria on the external surface of the patella. Moreover, from fig. 226 in Vachon (1974: 942 – see below under *S. longimanus*) it appears that he based his conclusion on misidentified specimens and saw the holotype of *S. binghamii* only in 1980.



Figs 33–34. *Scorpiops dastychi* sp. n. 33. Male holotype, dorsal aspect. 34. Female allotype, dorsal view of pedipalp.

Because of occasional confusion with *S longimanus*, and formerly also with *Scorpiops montanus*, it is necessary to view with suspicion some of the above cited counts of ventral trichobothria on the patella and of pectinal teeth

Distribution Myanmar (Pocock 1893 328), Thailand (Kovařík 1993 113)

Scorpiops braunwalderi sp. n.

(Figs 7, 32, Tables 1–3)

Type locality and type deposition India, Uttar Pradesh, Chakrata, FKCP

Type material examined **India** Uttar Pradesh, Chakrata, 1MA (holotype), 1980, FKCP

Etymology Named after the Swiss arachnologist Matt E Braunwalder, in appreciation of his kind help

Diagnostic characters Total length of the male holotype is 40 5 mm Measurements of the carapace, telson, segments of the metasoma and segments of the pedipalps, and numbers of pectinal teeth are given in Table 1 Habitus is shown in Fig 7 For the position and distribution of trichobothria on the tibia of pedipalps see Fig 32 There are 17 external trichobothria (5 eb, 2 esb, 2 em, 4 est, 4 et) (Fig 5) and 7 ventral trichobothria on the patella (Fig 29), and 6 pectinal teeth The carapace is sparsely and finely granulated, with two rows of larger granules in front of the median eyes

Color is uniform dark brown to black

The femur, patella, and tibia of pedipalps bear smooth keels and are granulated The manus dorsally bears large, irregularly spaced granules The fingers of pedipalps are only slightly flexed (Fig 32)

The mesosoma is granulated more in the posterior half of each segment and bears one conspicuous median keel The granules are fine and very widely spaced, however The seventh mesosomal segment ventrally bears four rows of granules

All keels on metasomal segments are composed of large granules of irregular shape The spaces between keels are only sparsely granulated The dorsolateral keels of the first through fourth metasomal segments are composed of posteriorly inclined teeth The telson is densely granulated and bears two symmetrical lateral furrows with smooth walls These furrows are more pronounced than in *S hardwickii*

Affinities The described features distinguish *S braunwalderi* sp n from all other species of the genus *Scorpiops* They are recounted in the key below

The new species is best characterized by the shape of the manus of pedipalps (see Figs 7, 56–57, and Table 2), which in the male of *S braunwalderi* sp n is markedly narrower and longer (Fig 7) than in the male of *S hardwickii* (Fig 56) The fingers of pedipapalps are only slightly flexed in the male of *S braunwalderi* sp n (Fig 32), whereas in the male of *S hardwickii* the flexure is very strong (Figs 56 and 47)

Scorpiops dastychi sp. n.

(Figs 29, 33, 34, 45, 50–51, Tables 1–3)

Type locality and type deposition India, Himalaya, Uttar Pradesh, Molta, ZMUH

Type material examined **India (Uttar Pradesh)** Himalaya, Molta, 3 000 m, Deutsche Indien Expedition 1955 57, leg G A von Maydall 6 V 1956 9MA (holotype, paratypes Nos 1–8) 5FA (allotype paratypes Nos 27–31) 3im A (paratypes Nos 74–76), ZMUH No 386, 9 V 1956, 1MA (paratype No 9) 4FA (paratypes Nos 32–35) 3im A (paratypes Nos 77–79) ZMUH No 389, 16 V 1956, 7MA (paratypes Nos 10–16) 12FA (paratypes Nos 36 47) 4im A (paratypes Nos 80 83), ZMUH No 402–3, 17 V 1956, 2MA (paratypes Nos 17–18) 12F(3im)A

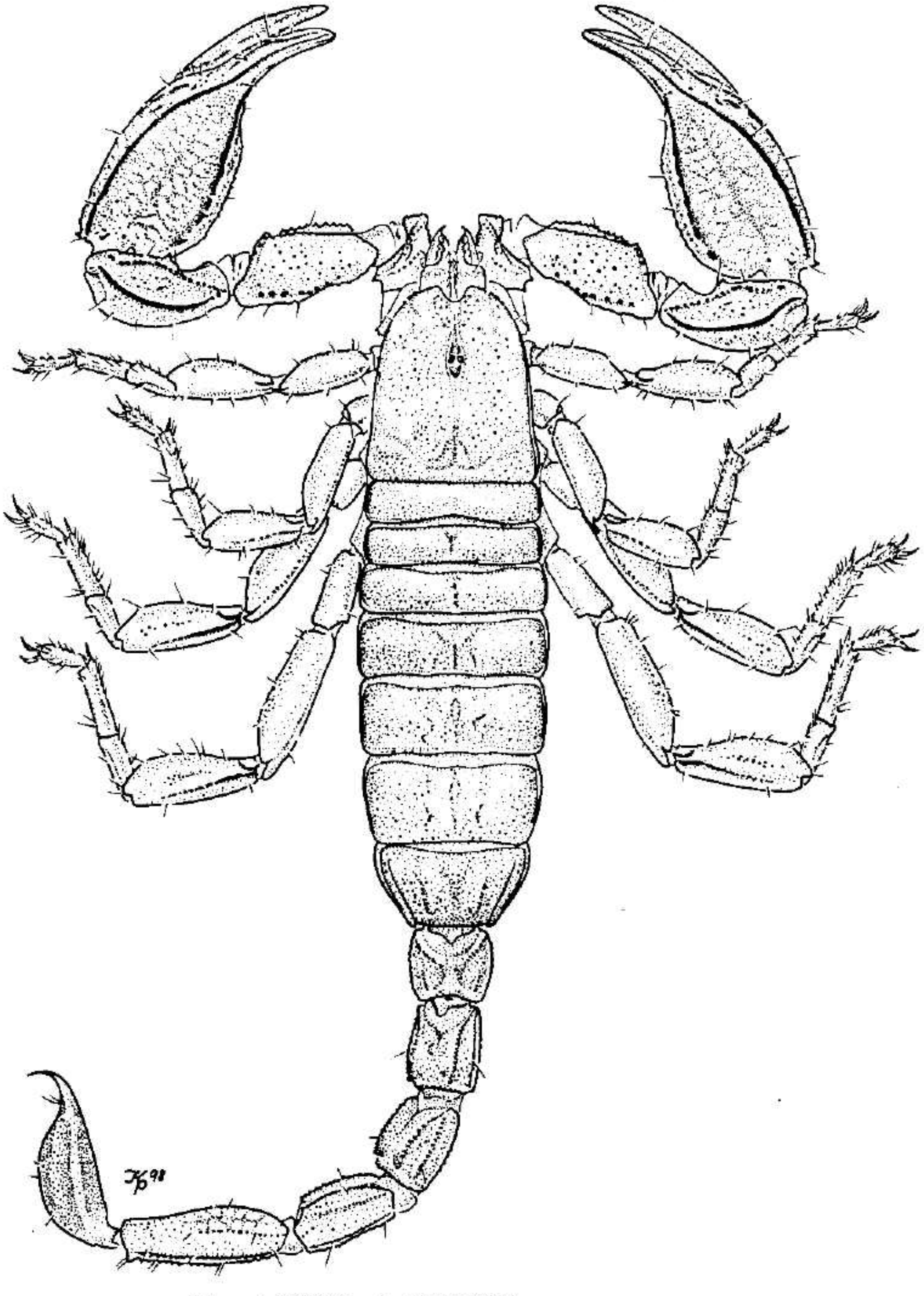


Fig. 35. *Scorpiops petersii* Pocock, FKCP female, dorsal aspect.

(paratypes Nos 48–59), ZMUH No. 405, 26 V 1956, 5MA (paratypes Nos 19–23) 3FA (paratypes Nos 60–62), ZMUH No 416, 11 VI 1956, 2MA (paratypes Nos 24–25) 5FA (paratypes Nos 63–67) 3juvsA (paratypes Nos 84–86), ZMUH No 430, 13 VI.1956, 1FA (paratype No 68), ZMUH No 432, 19 VI 1956, 4FA (paratypes Nos 69–72) 1juv A (paratype No 87), ZMUH No 449, 20 VI 1956, 1juv A (paratype No 88), ZMUH No 444, Chakrata, 19 VI 1956, 1FA (paratype No 73), ZMUH No 448, Timli Siwalik, 19 VII 1956, 1MA (paratype No 26), ZMUH No 513 Holotype, allotype, and paratypes Nos 11–26, 32–35, 38–88 are deposited in ZMUH, paratype No 5 in BMNH, paratype No 6 in SMFD, paratypes Nos 7 and 37 in ZMHB, paratype No. 8 in ROCC, paratype No. 9 in MZUF, paratypes Nos 10, 36 in NMPC, paratype No. 30 in MBCZ, paratype No. 31 in MCSN, and paratypes Nos 1–4, 27–29 in FKCP.

ETYMOLOGY. Named after Dr Hieronymus Dastych, curator at the Zoologisches Institut und Zoologisches Museum, Universität Hamburg, Germany, in appreciation of his kind help.

DIAGNOSTIC CHARACTERS. Total length is 35–41 mm. In contrast to female, the male has a longer and narrower manus of pedipalps (Figs 33–34, 50–51, Tab. 1). Habitus is shown in Fig. 33. Mesosomal segments of the female bear large, closely spaced granules. In males the granules are small and sparse, or may be altogether absent. Measurements of the carapace, telson, segments of the metasoma and segments of the pedipalps, and numbers of pectinal teeth are given in Table 1. For position and distribution of trichobothria on the tibia of pedipalps see Figs 29, 33–34, 45, and 50–51. The large number of examined specimens (27 M, 48 F, 15 juvs) allows to discern variation in the position of trichobothria on the external surface of patella and tibia of pedipalps. The number of trichobothria on the patella is 17 on the external surface (5 eb, 2 esb, 2 em, 4 est, 4 et) (Fig. 5) and 7 on the ventral surface (Fig. 29), but one male (paratype No. 2) has 8 ventral trichobothria on one patella and 7 on the other. Pectinal teeth number 4–7.

The carapace and mesosoma are similarly granulated. The mesosoma bears one median keel, which is less developed in the males. The seventh mesosomal segment ventrally bears four conspicuous keels.

AFFINITIES The described features distinguish *S. dastychi* sp. n. from all other species of the genus *Scorpiops*. They are recounted in the key below.

S. dastychi sp. n. is closest to *S leptochirus* and *S. feti* sp. n., with which it shares the number of trichobothria on the tibia and patella of pedipalps and similar body proportions. However, smaller size (only up to 40.6 mm) distinguishes it from the other two species, which reach up to 58 mm (*S. leptochirus*). From *S feti* sp. n. is also differs in sexual dimorphism, as in *S. feti* sp. n the manus of pedipalps is rather similar in males and females, whereas in the male of *S. dastychi* sp. n. the manus is distinctly narrower and longer than in the female (Figs 33–34, 50–51, Tab. 1).

***Scorpiops farkaci* Kovařík, 1993**

(Figs 1–6, 52, 53, Tables 1–3)

Scorpiops (Scorpiops) farkaci Kovařík, 1993: 109; Kovařík, 1994: 65; Kovařík, 1995. 199.
Scorpiops farkaci Kovařík, 1998 142

TYPE LOCALITY AND TYPE DEPOSITION. Thailand, bor., prov. Mae Hong Son, Ban Huai Po; FKCP

TYPE MATERIAL EXAMINED **Thailand**· bor , prov. Mae Hong Son , Ban Huai Po, 10 V 1991, leg J Farkač, 1ME2MA (holotype, paratypes Nos 1–2), 2FE4FA (paratypes Nos 3–8), 4F(im.)A (paratypes Nos 9–12), and also young that

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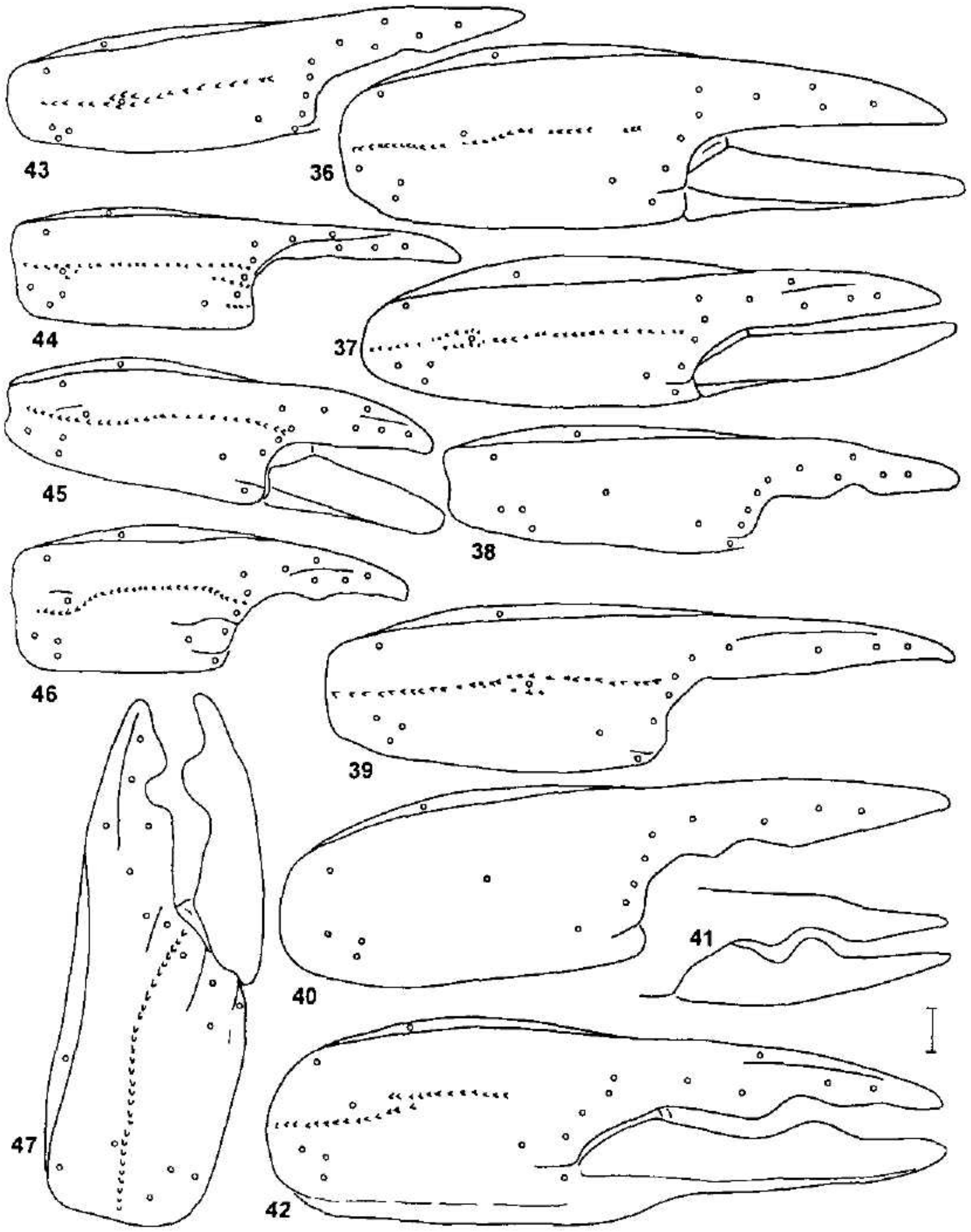
Figs 36–47 Tibia (chela) of pedipalp, external view 36. *Scorpiops feti* sp n , male holotype 37 *S leptochirus* Pocock, male holotype 38 *S montanus* Karsch, juv holotype. 39. *S longimanus* Pocock, ZMUH male 40 *S problematicus* sp n , female allotype. 41. *S montanus* Karsch, ZMUH male, fingers of pedipalp 42 *S petersii* Pocock, male lectotype 43 *S sejnai* sp n , male holotype 44 *S lindbergi* Vachon, FKCP female. 45 *S dastychi* sp n , male holotype 46 *S hardwickii* (Gervais), male lectotype of *S solidus* Karsch. 47 *S tibetanus* Hirst, male holotype.



were succesfully reared from imported females They include 4juvsE before the first ecdysis (Paratypes Nos 13–16), 2juvsE after the first ecdysis (paratypes Nos 17–18), 2juvsE7juvsA after the second ecdysis (paratypes Nos 19–27), 2juvsA after the third ecdysis (paratypes Nos 28–29), breeding by F Kovařík (3 x first ecdysis, 3 x second ecdysis, 2 x third ecdysis, 2 x sixth ecdysis) Paratype No 3 in the collection of Jan Farkač, Prague, paratype No. 4 in NMPC, other types in FKCP.

DIAGNOSTIC CHARACTERS. Total length is 24.8–32.5 mm for males and 27.3–36 6 mm for females. Habitus is shown in Kovařík (1993: 114 fig 13). Color photos of the still-alive male holotype and female paratype No. 5 carrying young is in Kovařík (1998: 96). In contrast to the female, the adult male has a considerably narrower manus (see Table 1 and Figs 52–53). Both males and females have the fingers straight, without any flexure. Measurements of the carapace, telson, segments of the metasoma and segments of the pedipalps, and numbers of pectinal teeth are given in Table 1. For position and distribution of trichobothria on the tibia and patella of pedipalps see Figs 1–6. The number of trichobothria on the patella is 17 on the external surface (5 eb, 2 esb, 2 em, 4 est, 4 et) (Fig. 5) and 9 on the ventral surface (Fig. 6). Pectinal teeth number 5–7.

The carapace is finely but sparsely granulated, with the granules becoming larger only between the anterior edge of the carapace and the median eyes. This space is laterally bordered by two smooth, symmetrical facets situated behind the lateral eyes which are altogether devoid of granules.

The manus of pedipalps dorsally bears irregular lines of fine granules that form a lattice with smooth facets in between. In the center of the manus is a conspicuous longitudinal strip composed of larger granules.

The mesosoma bears one median keel and is granulated mainly in its posterior part. The seventh mesosomal segment ventrally bears four conspicuous granulated keels.

All keels on metasomal segments are composed of tooth-like tubercles which are especially pronounced on the dorsolateral keels of the first four segments, where the teeth increase in size posteriorly. The spaces between keels bear sparse granules.

COMMENTS. *This species is known only from the type material collected in a xeric clearing of a virgin* mountain forest at elevations 1600–1700 m; all specimens were found beneath dry bufallo dung. Specimens were brought live and two females gave birth; the offspring were kept alive until the third ecdysis. For a while I also kept live two immature individuals (see sixth ecdysis under type material).

DISTRIBUTION. Thailand (Kovařík 1993: 111).

Scorpiops feti sp. n.

(Figs 17, 36, 49, 54–55, Tables 1–3)

Scorpiops leptochirus Kraepelin, 1913. 158 (*in part*).

TYPE LOCALITY AND TYPE DEPOSITION. India, Sikkim; ZMUH.

TYPE MATERIAL EXAMINED **India** Sikkim, 2M3F4im 3juvsA (holotype, allotype, and paratypes Nos 1–10), Mus. Calcutta, VII 1913; West Bengal, Darjeeling, 1M2F1M(im)A (paratypes Nos 11–14), Mus Calcutta, VIII 1913, Darrang, 1FA (paratype No 15), Mus. Calcutta, X 1912; Libsagar, 1MA (paratype No 16), Mus Calcutta, X 1912 All types labeled as *Scorpiops leptochirus*. Paratypes Nos 1 and 3 (1M1F) are deposited in FKCP, other types in ZMUH

ETYMOLOGY. Named after Dr Victor Fet, an arachnologist at Marshall University, West Virginia, USA.

DIAGNOSTIC CHARACTERS. *Total length is 45–55 mm. The male has a larger telson and much larger* pectines than the female. Fingers are nearly straight in both sexes. Measurements of the carapace, telson, segments of the metasoma and segments of the pedipalps, and numbers of pectinal teeth are given in Table 1. Habitus is shown in Fig. 49. For position and distribution of trichobothria on the tibia and patella of pedipalps see Figs 17, 36, 54–55. There are 17 trichobothria on the external surface of the patella (5 eb, 2 esb, 2 em, 4 est, 4 et) (Fig. 5), and the position of some of them (for example em2) is variable. Ventral trichobothria on the patella number 7 (Fig. 29). Pectinal teeth number 6–8.

The carapace and mesosoma are so sparsely granulated that they appear to be nearly smooth. The mesosoma bears but a few fine granules and one median keel. Granulation is more discernible on posterior segments, namely in females. The seventh mesosomal segment ventrally bears four conspicuous keels.

The ventral keel on the fifth metasomal segment consists of sharp, posteriorly inclined teeth.

AFFINITIES. The described features distinguish *S. feti* sp. n. from all other species of the genus *Scorpiops*. They are recounted in the key below.

S. feti sp. n. is closest to *S. leptochirus* and *S. dastychi* sp. n., with which it shares the number of trichobothria on the tibia and patella of pedipalps and similar body proportions. However, it is larger (up to 55 mm) than *S. dastychi* sp. n., which is known to reach only 40.6 mm, and it differs from both in sexual dimorphism. Whereas in *S. feti* sp. n. the shope of the male and female manus of pedipalps is nearly identical, the males of *S. leptochirus* and *S. dastychi* sp. n. have the manus narrower and longer than females. This is most pronounced in *S. leptochirus*, whose tibia length to manus width ratio in adult male is up to 3.9 (holotype). In *S. feti* sp. n. this ratio is 2.9–3.1.

***Scorpiops hardwickii* (Gervais, 1843)**

(Figs 14, 46, 56, 57, Tables 1–3)

Scorpio hardwickii Gervais, 1843 131, Karsch, 1879 19
Scorpio (Scorpius) hardwickii Gervais, 1844a 234 (redescription), Gervais, 1844b 66
Scorpiops hardwicki Simon 1887 113, Stahnke, 1974 124, Vachon, 1974 897
Scorpiops hardwickii Thorell, 1876 14, Ausserer, 1880 465, Kraepelin 1894 188, Laurie, 1896 123, Pocock, 1900 66, Werner, 1934 283, Takashima, 1945 98, Mani, 1959 14, Minnocci, 1974 42
Scorpiops hardwickei Kraepelin, 1899 181, Pocock, 1899 268, Kraepelin, 1913 157 Birula, 1913 418, Fage, 1944 73, Polis, 1990 252, Goyfon, 1993 246 Kovařík, 1998 142
Scorpiops hardwickei typicus Kraepelin, 1913 155
Scorpiops (Scorpiops) hardwickei hardwickei Kovařík, 1994 66
Scorpiops (Scorpiops) hardwickei Vachon, 1980 150, Tikader & Bastawade, 1983 406, Bastawade, 1994 436
Scorpiops solidus Karsch, 1879 106 (TL Himalaya, ZMHB), Ausserer 1880 466, Moritz & Fischer 1980 324 (syn by Kraepelin, 1894 188)
Scorpiops affinis Kraepelin 1898 44 (TL Himalaya, ZMUH), Kraepelin, 1899 182, Pocock, 1900 75, Takashima, 1945 99, Minnocci, 1974 42, **syn. n.**
Scorpiops hardwickei affinis Kraepelin, 1913 154, Kovařík, 1998 142
Scorpiops (Scorpiops) hardwickei affinis Vachon, 1980 150, Kovařík, 1994 66
Scorpiops (Scorpiops) affinis Tikader & Bastawade, 1983 418
Scorpiops crassimanus Pocock, 1899 267 (TL unknown, BMNH), Pocock, 1900 68, Hirst, 1911 472, Kraepelin, 1913 158, Fage, 1944 73, Takashima, 1945 99, Minnocci, 1974 42, Kovařík, 1994 61, Kovařík, 1998 142, **syn. n.**
Scorpiops (Scorpiops) crassimanus Vachon, 1980 150, Tikader & Bastawade, 1983 424
Scorpiops insculptus Pocock, 1900 68 (TL Western Himalayas, Jaunsar, BMNH), Takashima, 1945 98, Minnocci, 1974 42, **syn. n.**
Scorpiops hardwickei insculptus Kraepelin, 1913 155, Kovařík, 1998 142
Scorpiops (Scorpiops) hardwickei insculptus Vachon 1980 150, Kovařík, 1994 66
Scorpiops (Scorpiops) insculptus Tikader & Bastawade, 1983 412
Scorpiops austerus Hirst 1911 471 (TL Kulu District, Himalaya, BMNH), Takashima, 1945 99, Minnocci, 1974 42 (syn by Tikader & Bastawade, 1983 418)
Scorpiops (Scorpiops) austerus Vachon, 1980 151

Chaerilus pirpanjalus Mani, 1959 13 (TL Upper Beas Valley, Pir Panjal range, India, NZSI), Minnocci, 1974 31 (syn by Tikader & Bastawade, 1983 407)
Chaerilus pirpunjabus [sic] Tikader & Bastawade, 1983 407

TYPE LOCALITY AND TYPE DEPOSITION Himalaya; BMNH

TYPE MATERIAL EXAMINED **India** Himalaya, 1M2F1juv A (lectotype and paralectotypes Nos 1–3 of *Scorpiops solidus*), leg Trochnow, ZMHB No 3054, 1FA no location (holotype of *Scorpiops crassimanus*), BMNH, Himalaya, VI 1893, 1im A (lectotype of *Scorpiops affinis*), ZMUH, Western Himalayas, Jaunsár, 6000–9000 ft, 1MA (lectotype of *Scorpiops insculptus*), leg R C Wroughton, BMNH No 1896 8 15, Punjab, Kulu District, 1M1FA (lectotype and paralectotype No 1 of *Scorpiops austerus*), leg Rosenberg, BMNH No 1905 3 31 1 10, rev M Vachon (No VA 2510-1 and 3)
FURTHER MATERIAL EXAMINED **China (Tibet)** South Tibet, Nyainqentangha Mts , Lhasa nord, 3800 m, 30 V 1996, 1M1FE 2F3juvsA, leg V Major, FKCP **India** Dehra Dun, 1M2FA, leg H Phipson, BMNH No 1896 2 2 12 20, Dehra Dun, 14 II 1898, 2F(im)A, ZMUH No 1583, Nyuli Tal, 1M1FA, Mus Calcutta, X 1912, ZMUH, 2M3F4juvsA, Mus Calcutta, X 1912, ZMUH, Simla Hills, 1M1F, Mus Calcutta, VII 1913, ZMUH, Sikkim, 1M(im)E, NMPC, Hindustan, 1FE, leg Schlaginxwei, NMPC, Timli Siwalik, 18 VII 1956, 2F1juv A, Deutsche Indien-Expedition 1955–57, ZMUH No 22 and 505, Uttar Pradesh, Kumaon Hills, Bhimtal near Sattal, 27 XII 1972, 1juv A, 28 XII 1972, 1juv A, 27 III 1972, 1juv A, 28 III 1973, 1FA, 29 III 1973, 2FA, 30 III 1973, 1F1juv A, 31 III 1973, 1F2juvsA, 20 V 1973, 1juv A, 1 VI 1973, 1MA, 4 VI 1973, 1juv A, 31 VIII 1973, 1FA, 12 XII 1976, 1MA, leg F Smetacek, ZMUH, Kashmir, Gulmarg-Tangmarg, 2300–2650 m, 3 VII 1976, 2FA, leg W Wittmer, NHMB, Kashmir, Yusmarg, 2300–2400 m, 5 VII 1976, 5F1juv A, leg W Wittmer, NHMB, Kashmir, Pahalgam, 2200–3100 m, 7 –8 VII 1976, 1M1juv A, leg W Wittmer, NHMB, Himachal Pradesh, Simla-Naldera, 2250 m, 3 V 1977, 2FA, leg W Wittmer & Brancucci, NHMB, Himachal Pradesh, Chopal, 2400–2750 m, 7 V 1977, 2juvsA, leg W Wittmer & Brancucci, NHMB, Kashmir, Dachigam, 2200 m, 18 VI 1980, 3M4F2juvsA, MZUF, Kashmir, avanti KUD, 1600 m, 25 VI 1980, 1FA, leg F Bernini, MZUF, Doranal, Garsa Valley, 1800 m, 29 VI 1980, 1M1FA, leg F Bernini, MZUF, Himachal Pradesh, Kuthi Forest, Kulu Valley, 2550 m, 20 24 VII 1983, 1I 1juv A, leg M L Azzaroli & Simonetta, MZUF, Himachal Pradesh, Kulu distr , tra Jaric Manikaran, Valle del Parbati, 13 –15 VI 1983, 1M2F5juvsA, leg M L Azzaroli & Simonetta, MZUF, Nord India, 10 km E Musoorte, 2300 m, 17 VIII 1985, 1FA, leg F Hlebe, ZMHB No 27013, bor , Uttar Prades, Badarinath, 4000 m, 7 VII 1994, 3F1juv E, FKCP, leg M Snižek, Badarinath, 4000 m, 7 –8 VII 1994, 1M2FE, leg M Valenta, FKCP, beetwen Badarinath and Govind Ghat, 9 –11 VII 1994, 1M1F2juvsE, leg M Valenta, FKCP, 15 km S Badarinath, 30 km N Joshinath, 10 VII 1994, 3FE, leg M Snižek, FKCP, Joshinath, Auli, 2800 m, 13 – 16 VII 1994, 5FE, leg M Valenta, FKCP, Joshinath, Auli, 2800 m, 13 –17 VII 1994, 1FE, leg M Snižek, FKCP, Uttar Pradesh N, Nanital env , Bhimtal vill , 1400–1600 m, 6 –10 VIII 1997, 1ME, leg J Schneider, FKCP **Pakistan** Himalaya mts, Kaghan valley, Thathabaya, 2200 m, 73°26'E, 34°36'N, 19 V 1998, 2FA, leg M Lazslo & G Ronkay, HNHM, Bar seen, 15 V 1998, 1FA, HNHM

DIAGNOSTIC CHARACTERS Total length is 36–58 6 mm. In contrast to females, males have fingers of pedipalps strongly flexed. Measurements of the carapace, telson, segments of the metasoma and segments of the pedipalps, and numbers of pectinal teeth are given in Table 1 For position and distribution of trichobothria on the tibia and patella of pedipalps see Figs 14, 46, 56–57 There are 17 external trichobothria (5 eb, 2 esb, 2 em, 4 est, 4 et) (Fig. 14) and 6–8 (mostly 6–7) ventral trichobothria on the patella. Pectinal teeth number 4–7.

The carapace is sparsely and finely granulated, and the granules sometimes form keels in its anteromedial part, in front of the median eyes. The anterior part also bears two smooth, symmetrical facets situated behind the lateral eyes, they are devoid of granules, but their surface is often uneven and shape irregular.

The mesosoma is granulated mainly in the posterior half of each segment and bears one median keel The seventh mesosomal segment ventrally bears four conspicuous keels.

All keels of the metasoma are composed of large, irregularly shaped granules. Spaces between the keels are finely granulated

COMMENTS. *Scorpiops hardwickii* is highly variable in granulation of the carapace (especially its anterior portion) and of the manus of pedipalps, which on the dorsal surface of the manus may attain the appearance of keels Variation is considerable also in the position of trichobothria on the

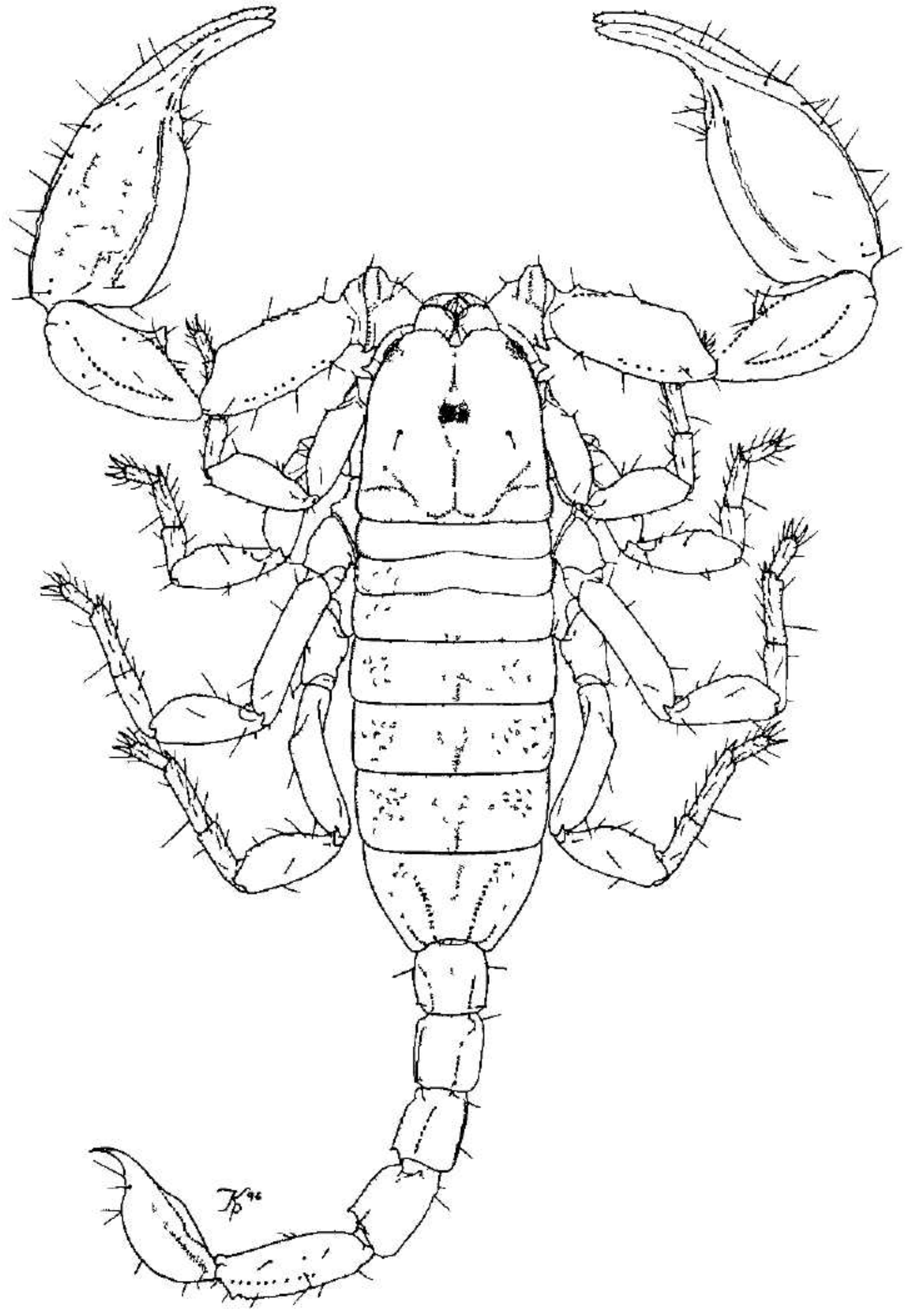


Fig. 48 *Scorpiops lindbergi* Vachon. MBCZ female, dorsal aspect

Tab. 3 Numbers of pectinal teeth in scorpiopid species Explanatory notes M – male, F – female, J – juvenile (includes only juves whose sex cannot be determined), x – number of pectinal teeth given by other authors, not from specimens examined in this study, NS – number of specimens Each pecten is consedered a unit Where both pectens are complete, they are counted twice. In contrast, pectens which are obviously abnormal or incomplete are not included

		number teeth in pecten										NS
	sex	4	5	6	7	8	9	10	11	12	13	
Alloscorpiops anthracinus	M	–	–	–	–	–	–	x	2	–	–	1
	J	–	–	–	–	–	–	–	2	–	–	1
A. lindstroemi		–	–	–	–	x	–	–	–	–	–	–
Dasyscorpiops grandjeani	F	–	–	–	–	x	x	–	–	–	–	–
Neoscorpiops deccanensis	F	–	–	2	x	–	–	–	–	–	–	1
N satarensis	M	–	–	–	2	–	–	–	–	–	–	1
	F	–	–	2	2	–	–	–	–	–	–	2
N tenuicauda	M	–	–	x	2	–	–	–	–	–	–	1
Parascorpiops montanus	F	–	–	2	–	–	–	–	–	–	–	1
Scorpiops asthenurus	M	–	1	1	x	–	–	–	–	–	–	1
	F	–	–	2	–	–	–	–	–	–	–	1
S bhutanensis		–	–	–	x	–	–	–	–	–	–	–
S binghamii	M	–	–	–	2	x	2	–	–	–	–	2
	F	–	–	1	1	x	1	–	–	–	–	2
S braunwalderi **sp. n.**	M	–	–	2	–	–	–	–	–	–	–	1
S dastychi **sp. n.**	M	–	3	45	6	–	–	–	–	–	–	27
	F	1	47	40	6	–	–	–	–	–	–	48
	J	–	11	18	1	–	–	–	–	–	–	15
S farkaci	M	–	–	–	6	–	–	–	–	–	–	3
	F	–	2	18	–	–	–	–	–	–	–	10
	J	–	7	9	7	–	–	–	–	–	–	13
S feti **sp. n.**	M	–	–	–	–	10	–	–	–	–	–	5
	F	–	–	–	11	1	–	–	–	–	–	6
	J	–	–	1	7	6	–	–	–	–	–	7
S hardwickii	M	–	2	20	20	–	–	–	–	–	–	21
	F	5	51	65	8	–	–	–	–	–	–	66
	J	–	17	23	14	–	–	–	–	–	–	28
S irenae	F	–	1	1	–	–	–	–	–	–	–	1
S jendeki **stat. n.**	M	–	2	–	–	–	–	–	–	–	–	1
	F	11	5	–	–	–	–	–	–	–	–	8
S kaftani	F	–	–	2	–	–	–	–	–	–	–	1
S leptochirus	M	–	–	–	3	x	x	–	–	–	–	2
	F	–	–	–	2	–	–	–	–	–	–	1
S lindbergi	M	–	–	–	–	–	1	–	–	–	–	1
	F	–	–	2	4	2	–	–	–	–	–	4
S longimanus	M	–	–	–	–	4	6	–	–	–	–	5
	F	–	–	x	11	1	–	–	–	–	–	6
	J	–	–	–	3	3	2	–	–	–	–	4
S margerisonae **sp. n.**	M	–	–	–	–	–	–	–	–	1	1	1
S. montanus	M	–	–	1	4	12	1	–	–	–	–	9
	F	–	–	5	22	–	–	–	–	–	–	14
	J	–	–	–	12	6	–	–	–	–	–	9
S oligotrichus		–	–	–	–	–	–	–	–	–	–	–
S pachmarhicus	M	–	–	–	x	–	–	–	–	–	–	–
	F	–	–	x	–	–	–	–	–	–	–	–
S petersii	M	1	15	19	5	32	2	–	–	–	–	38
	F	1	4	7	45	5	–	–	–	–	–	33
	J	–	–	2	21	17	–	–	–	–	–	20

Tab 3 continued

	sex	number teeth in pecten 4	5	6	7	8	9	10	11	12	13	NS
S problematicus **sp n.**	M	–	–	–	–	6	–	–	–	–	–	3
	I	–	–	–	2	–	–	–	–	–	–	1
	J	–	–	–	6	2	–	–	–	–	–	4
S rohtangensis		–	x	x	–	–	–	–	–	–	–	–
S sejnai **sp n**	M	–	–	2	–	–	–	–	–	–	–	1
	F	3	5	3	1	–	–	-	–	–	–	6
S tibetanus	M	–	1	1	3	1	2	4	2	–	-	7
	F	–	–	1	8	12	5	4	1	–		16
	J	–	–	1	3	10	7	5	2	–	–	14

chela of pedipalps The shape of the chela of pedipalps gradually changes during ontogeny, which complicates identification of solitary immature specimens

The descriptions of hereby synonymized species and subspecies were based on small numbers of specimens, which precluded any possibility of discerning variation

Scorpiops affinis is based on an undisclosed number of specimens (Kraepelin 1898 44), but there clearly were more than one and probably several because Kraepelin counted 5–7 pectinal teeth and the only type deposited at ZMUH, which I have examined, has 6 pectinal teeth It is an immature specimen, probably a female, which I have designated as the lectotype Its total length is 33 3 mm and it has 7 ventral trichobothria on the patella

Scorpiops insculptus is based on a male and a female (Pocock 1900 68), of which I examined the male and designated it the lectotype *Its total length is 36 mm (see Table 1), ventral trichobothria on* the patella number 7, and pectinal teeth number 6 The manus of pedipalps bears non-granulated keels This male was in 1980 examined also by Max Vachon (No VA 2495) Kraepelin (1913) and Vachon (1980) regarded this taxon as a subspecies of *S hardwickii*, whereas Tikader & Bastawade (1983) considered it a separate species However, in my opinion there are no characters to separate *S insculptus* from *S hardwickii* or to even afford it the status of a subspecies

Scorpiops austerus is based on a large number of specimens (Hirst 1911 472), of which I examined a male and a female and designated them the lectotype and paralectotype No 1, respectively Ventral trichobothria on the patella number 7, and pectinal teeth number 6 in the male and 4–5 in the female

Scorpiops crassimanus is based on a female without exact locality (Pocock 1899 268), which I have examined It has 8 ventral trichobothria on the patella and 5–6 pectinal teeth Pocock (1899) distinguished *S crassimanus* from *S hardwickii* on keels and granulation on the dorsal surface of the manus and patella, which in *S hardwickii* are very variable and therefore cannot be used as evidence for more than one species Also the presence of 8 ventral trichobothria on the patella was later used as a character However, this number is encountered in *S hardwickii* too (for example in ZMUH specimens collected at Bhimtal) and can vary in an individual, with some of the examined specimens having 8 ventral trichobothria on one patella and 7 on the other (or 6 and 7) Examination of the holotype of *S crassimanus* and the specimens listed under Material convinces me that *S crassimanus* is not a valid species

Distribution China (Tibet) (first report), India (Himachal Pradesh, Uttar Pradesh, Jammu, Kashmir, Punjab), Nepal (Gervais 1844a 234, Kraepelin 1899 182, Pocock 1900 67, Tikader & Bastawade 1983 407), Pakistan (first report)

Scorpiops irenae Kovařík, 1994
(Figs 25, 58, Tables 1–3)

Scorpiops (Scorpiops) irenae Kovařík 1994 61
Scorpiops irenae Kovařík, 1998 142

TYPE LOCALITY AND TYPE DEPOSITION Nepal, Arun Valley, Chichila-Mure, FKCP

TYPE MATERIAL EXAMINED **Nepal** Arun Valley Chichila Mure, 2050 m, 7 VI 1992, 1FE (holotype), leg J Probst, FKCP

DIAGNOSTIC CHARACTERS Total length is 51 3 mm Measurements of the carapace, telson, segments of the metasoma and segments of the pedipalps, and numbers of pectinal teeth are given in Table 1 For position and distribution of trichobothria on the tibia of pedipalps see Figs 25, 58, and Kovařík (1994 63 figs 1–6) There are 17 external trichobothria (5 eb, 2 esb, 2 em, 4 est, 4 et) (Fig 5) and 6 ventral trichobothria on the patella, and only 3 ventral trichobothria (the least in the genus) on the manus (Fig 25) Pectinal teeth number 5–6

The holotype is black except for the chela and telson which are dark reddish brown, and tarsomere II which is lighter reddish brown

The carapace bears sparse granules of different sizes They are more closely spaced in the anterior part, which also bears two smooth, symmetrical facets situated behind the lateral eyes

The manus of pedipalps dorsally bears irregular rows of fine granules forming a loose lattice with smooth central facets In the center of the manus is a conspicuous longitudinal strip of larger granules

The mesosoma bears one median keel and is very sparsely granulated The ventral surface of the seventh mesosomal segment has four granulated keels

All keels on the metasomal segments are pronounced and composed of toothlike tubercles The dorsolateral keels of the second through fourth segments each terminate in a tooth which is larger than the proceding teeth The spaces between keels contain sparse fine granules

COMMENTS This species is known only from the holotype *S irenae* is closest to *S petersii*, from which it differs in having only three ventral trichobothria on the manus (Fig 25)

DISTRIBUTION Nepal (Kovařík 1994 61)

Scorpiops jendeki Kovařík, 1994 stat. n.
(Figs 59, 60, Tables 1–3)

Scorpiops (Scorpiops) hardwickei jendeki Kovařík, 1994 62
Scorpiops hardwickei jendeki Kovařík, 1998 142

TYPE LOCALITY AND TYPE DEPOSITION China, Yunnan Province, Gaoligongshan Nature Reserve 100 km west of Baoshan, FKCP

TYPE MATERIAL EXAMINED **China** Yunnan Province, Gaoligongshan Nature Reserve 100 km west of Baoshan 1FE (holotype) 1FE (paratype No 4) 4FA (paratypes Nos 1–3, 5), 14–21 VI 1993, leg E Jendek & O Šauša, FKCP and NMPC (paratype No 1)
FURTHER MATERIAL EXAMINED **China** Yunnan Province, Gaoligongshan, 100 km West of Baoshan, 24°57' N 98°45' E 1M1FA (topotypes), 9 V 1995, leg V Kubáň, FKCP, Yunnan prov , Gaoligongshan, near Baoshan, VI 1996, 1FE, leg Pacalaj

DIAGNOSTIC CHARACTERS Total length is 30–42 1 mm Measurements of the carapace, telson, segments of the metasoma and segments of the pedipalps, and numbers of pectinal teeth are given in Table 1 For position and distribution of trichobothria on the tibia of pedipalps see Figs 59–60 and

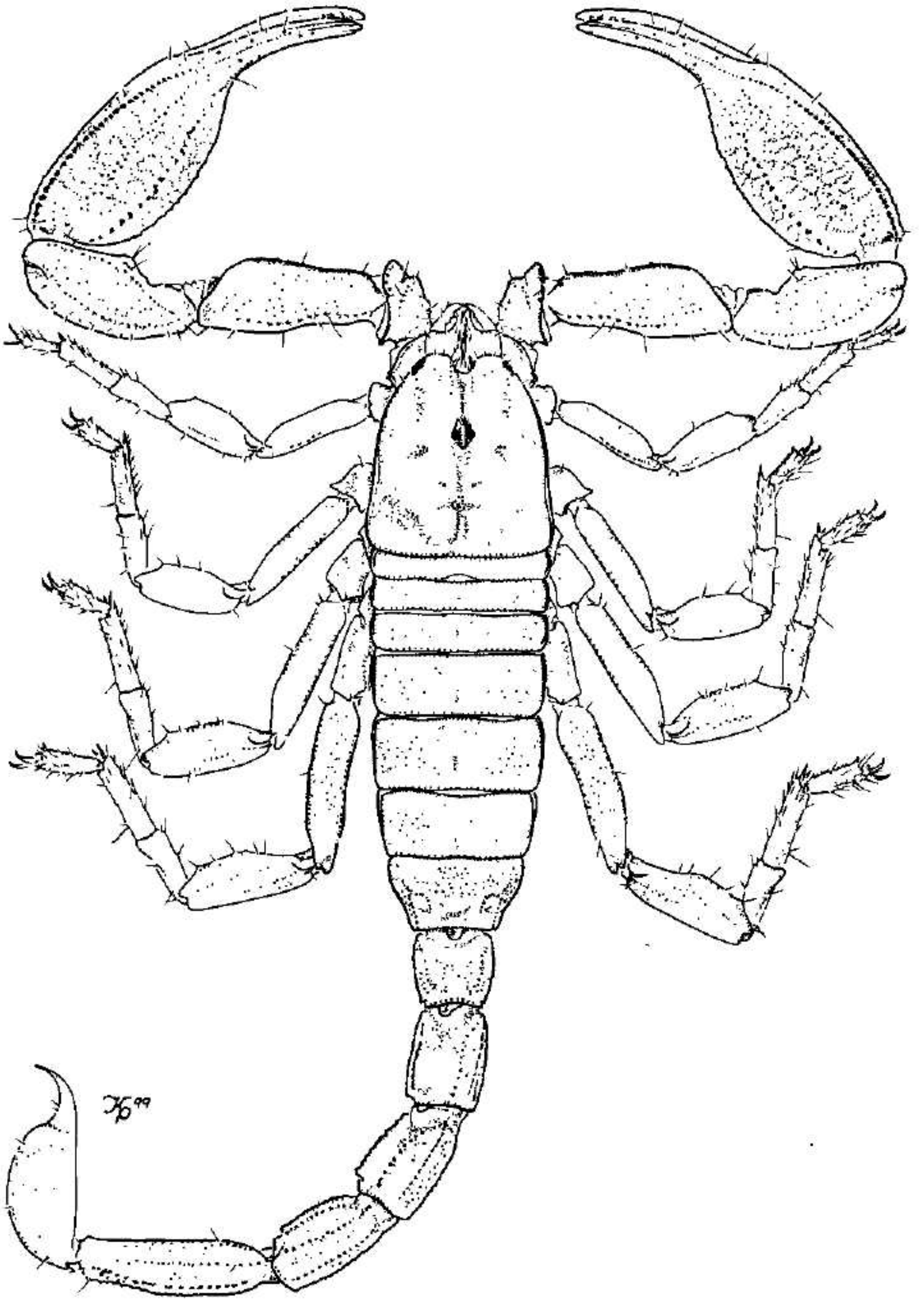


Fig. 49. *Scorpiops feti* sp. n., male holotype, dorsal aspect.

Kovařík (1994: 64 figs 7–12). There are 17 external trichobothria (5 eb, 2 esb, 2 em, 4 est, 4 et) (Fig. 5) and 6–7 ventral trichobothria on the patella (only one male and one female collected on 9 V.1995 have 7 ventral trichobothria on one patella of pedipalps and 6 on the other). Pectinal teeth number 4–5. Both males and females have fingers of pedipalps straight, without any flexure.

The carapace bears very sparse large granules, and behind the lateral eyes has a pair of smooth, symmetrical facets.

The manus of pedipalps dorsally bears irregular rows of granules forming a loose lattice with smooth central facets. In the center of the manus is a longitudinal strip of larger granules. Internal surface of the manus bears several well developed, pointed granules.

The first and second segments of the mesosoma lack a median keel. Other segments have a well developed median keel and sometimes also a vague lateral keel on each side. The seventh mesosomal segment bears four ventral keels.

All keels on metasomal segments are well developed and composed of toothlike tubercles that become slightly larger posteriorly. The spaces between keels contain sparse fine granules

COMMENTS. This species was described as a subspecies of *S. hardwickii*. Upon examination of more specimens of *S. hardwickii* and obtaining more specimens of *S. jendeki* I have become convinced that they are separate species. The male of *S. jendeki* has the fingers of pedipalps straight, whereas in *S. hardwickii* they are flexed. Moreove, *S. jendeki* is smaller (Table 1) and differs in granulation of the carapace and presence of conspicuous pointed granules on the internal surface of manus of pedipalps.

DISTRIBUTION. China (Yunnan) (Kovařík 1994: 62).

Scorpiops kaftani **Kovařík, 1993**

(Fig. 61, Tables 1–3)

Scorpiops (Euscorpiops) kaftani Kovařík, 1993: 113
Euscorpiops kaftani Kovařík, 1998: 141

TYPE LOCALITY AND TYPE DEPOSITION. Vietnam, Cuc Phuong; FKCP.

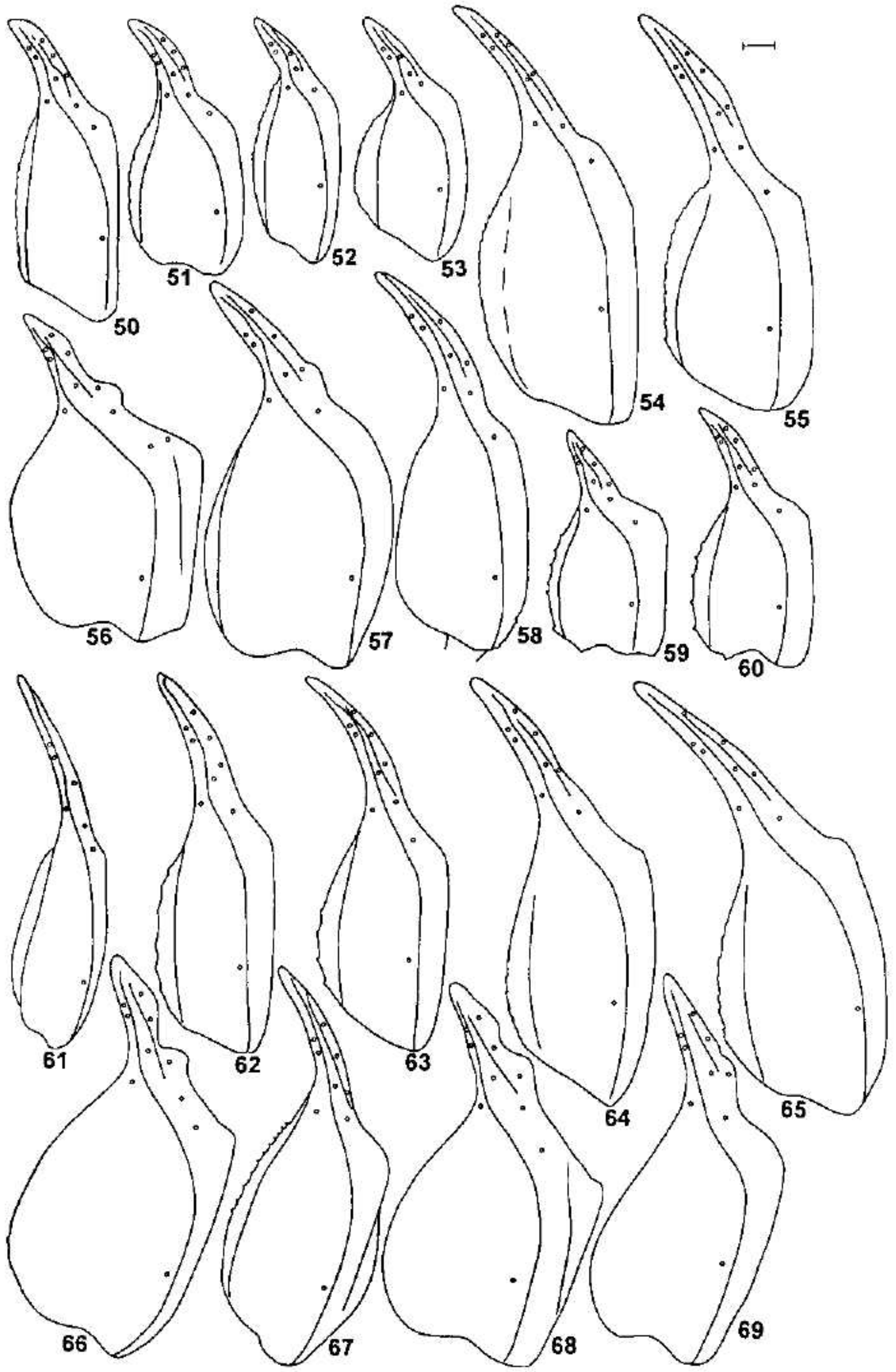
TYPE MATERIAL EXAMINED. **Vietnam**, prov. Ninh Binh, Cuc Phuong, V.1986, 1FE (holotype), leg. M. Kaftan, FKCP

DIAGNOSTIC CHARACTERS. *Total length of the female holotype is 31.5 mm. No other specimens* are known. The fingers of pedipalps are straight. For position and distribution of trichobothria on the tibia of pedipalps see Fig. 61 and Kovařík (1993: 112 figs 7–12). There are 19 external trichobothria (5 eb, 2 esb, 2 em, 5 est, 5 et) and 13 ventral trichobothria on the patella. The habitus is shown in Kovařík 1993: 12. Measurements of the carapace, telson, segments of the metasoma and segments of the pedipalps, and numbers of pectinal teeth are given in Table 1. Pectinal teeth number 6. The tibia of pedipalps is very narrow (Fig. 61, Table 1). The tibia length to manus width ratio is 4.4. The carapace bears large, unevenly spaced granules.

The manus of pedipalps dorsally bers keels forming a lattice. These keels are nearly smooth, composed of but a few granules.

→

Figs 50–69 Tibia of pedipalp, dorsal view 50–51 *S. dastychi* sp. n. 50. Male holotype 51 Female allotype Figs 52–53 *S. farkaci* Kovařík 52 Male holotype 53 Female paratype No. 7 54–55 *S. feti* sp. n. 54. Male holotype. 55 Female allotype 56–57 *S. hardwickii* (Gervais) 56 FKCP male 57 FKCP female 58. *S. irenae* Kovařík, female holotype 59–60 *S. jendeki* Kovařík. 59 FKCP male 60 Female allotype 61 *S. kaftani* Kovařík, male holotype 62–63 *S. leptochirus* Pocock 62 FKCP male 63 FKCP female 64–65 *S. problematicus* sp. n. 64 *Male holotype 65 Female allotype 66 S. margerisonae* sp. n., *male holotype 67 S. sejnai sp. n.*, *male holotype* 68–69 *S. tibetanus* Hirst 68 FKCP male 69 FKCP female



The mesosoma is sparsely granulated in the posterior half of each segment and bears one well developed median keel

The keels on metasomal segments are pronounced but blunt. Also the dorsolateral keel is pronounced, but without pointed granules.

COMMENTS. *Scorpiops kaftani* is based on a single female and no other specimens have hitherto been found. Despite that the species is easily distinguished from all others in the genus *Scorpiops* on the very narrow tibia of pedipalps The tibia length to manus width ratio is 4.4, which is the highest of all species of *Scorpiops* having more than 17 external trichobothria on the patella of pedipalps.

In August 1958 Cuc Phuong became a national park comprising 22000 ha (20°14' – 20°24' N and 105°29' – 105°44' E). The average temperature is 21°C (maximum 36°C in June and minimum 2°C in January), the average humidity is 90%, and the average rainfall is 2157 mm (224 rainy days annually). It is a basin in limestones and related carbonates, with altitudes of 200 – 350 m and surrounded by steep karst walls reaching 656 m above sea level, which separate the basin from extensive agricultural areas.

DISTRIBUTION. Vietnam (Ninh Binh) (Kovařík 1993: 113).

Scorpiops leptochirus Pocock, 1893
(Figs 37, 62, 63, Tables 1–3)

Scorpiops leptochirus Pocock, 1893: 325, Pocock, 1894: 79, Kraepelin, 1899: 181; Pocock, 1899: 268, Pocock, 1900: 69, Kraepelin, 1913: 158 (in part), Takashima, 1945: 98, Minnocci, 1974: 42; Kovařík, 1998: 142
Scorpiops (Scorpiops) leptochirus Vachon, 1980: 150, Tikader & Bastawade, 1983: 440; Kovařík, 1994: 65

TYPE LOCALITY AND TYPE DEPOSITION. N. E. Bengal; BMNH.

TYPE MATERIAL EXAMINED **Bangladesh** N E Bengal, 1MA (holotype), leg F Moore, BMNH No 1893 10 29 11, rev M Vachon 1980 (No VA 2493)
FURTHER MATERIAL EXAMINED **India** W Meghalaya, Garo Hills, Nokrek Nat Park, 25°40' N 91°04' E, 1150 m, 2–13 VII 1997, 1ME, leg E Afonin & V Siniaev, FKCP, Assam, Nameri Nat Park, 60 km N of Tezpur, 150 m, 27°20' N 93°15' E, 24 VII–2 VIII 1997, 1FE, leg E. Afonin & V Siniaev, FKCP

DIAGNOSTIC CHARACTERS. Total length is 40–58 mm (Pocock 1900: 69). Measurements of the carapace, telson, segments of the metasoma and segments of the pedipalps, and numbers of pectinal teeth are given in Table 1. Mesosomal segments of the female bear large, closely spaced granules. In males the granules are effaced and widely spaced, or may be altogether absent in some individuals. *Fingers of pedipalps are nearly straight in both sexes, but the tibia of pedipalps is much longer* and narrower in the males. For position and distribution of trichobothria on the tibia of pedipalps see Figs 37, 62–63. There are 17 external trichobothria (5 eb, 2 esb, 2 em, 4 est, 4 et) (Fig. 5) and 7 ventral trichobothria on the patella (Fig. 29). Pectinal teeth number 7–9.

The carapace is granulated, but not densely.

The mesosoma bears one median keel, and the seventh mesosomal segment ventrally bears four conspicuous keels.

COMMENTS. This species is based on single specimen which Pocock (1893: 326) thought was probably a female. In 1980 Vachon examined the type and declared it a male. Pocock (1893: 326) stated that the type is without locality data, but later (1894: 79) gave the type locality as "N. E. Bengal". Today the holotype is in alcohol, but originally it was a pinned dry mount.

Scorpiops leptochirus was confused with *S. feti* sp. n (Kraepelin 1913: 158), which makes some *of its formerly published characters doubtful.*

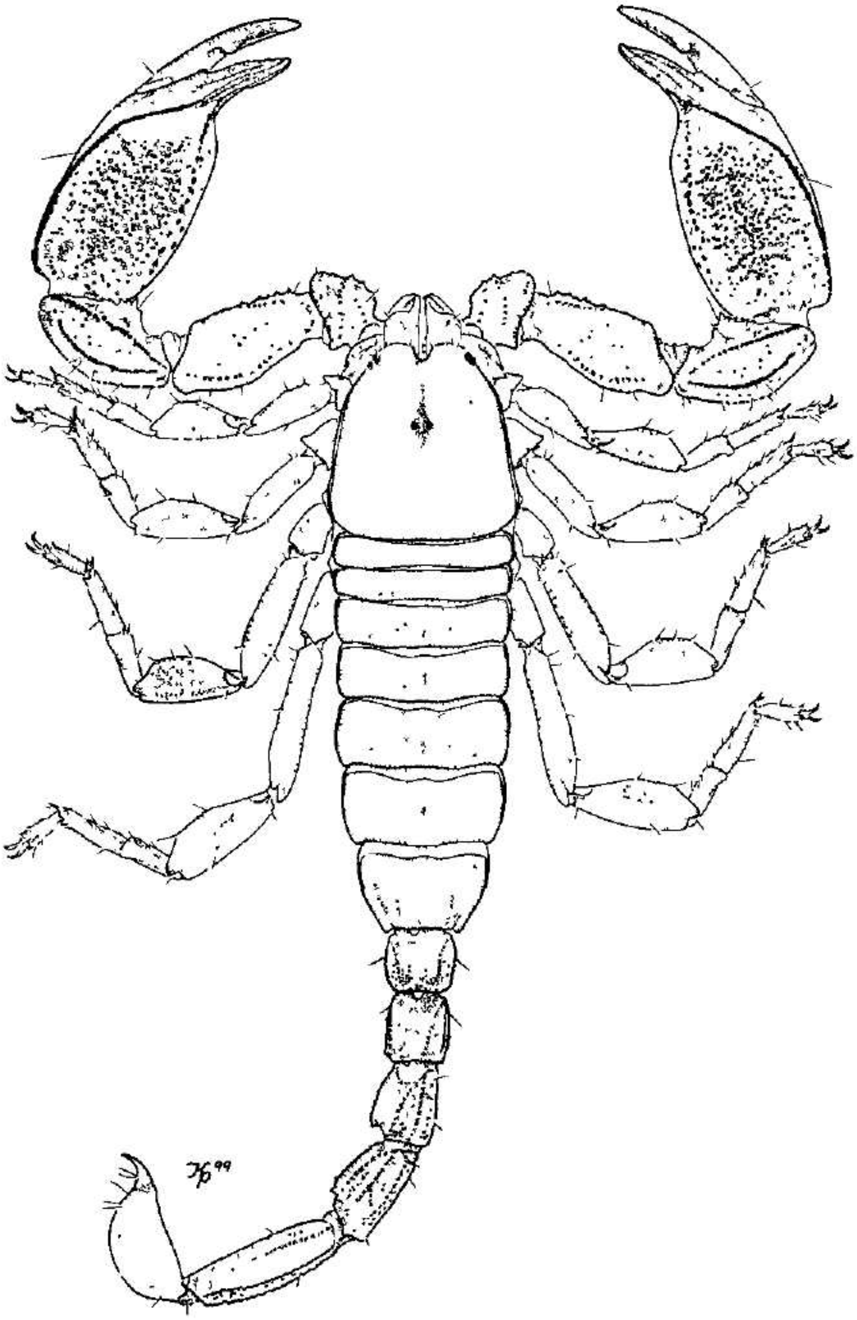


Fig. 70. *Scorpiops margerisonae* sp. n., male holotype, dorsal aspect

DISTRIBUTION. Bangladesh, India (Meghalaya, Assam) (Pocock 1894: 79, Tikader & Bastawade 1983: 445)

Scorpiops lindbergi Vachon, 1980

(Figs 18, 19, 44, and 48, Tables 1–3)

Pareuscorpius lindbergi Lindberg, 1961: 31 (nomen nudum); Minnocci, 1974 43.
Scorpiops (Euscorpiops) lindbergi Vachon, 1980 155, Kovařík, 1993 113
Scorpiops (Euscorpiops) lindberghi. Vachon & Kinzelbach, 1987 100
Scorpiops lindbergi Goyfon, 1993. 246
Euscorpiops lindbergi Kovařík, 1998: 141, Lourenço, 1998 250.
Scorpiops kraepelini Lourenço, 1998 246 (TL Pakistan, Loralai District, 14 miles East of Ziarat; ZMUH). Kovařík, 1998. 142, **syn. n.**

TYPE LOCALITY AND TYPE DEPOSITION. Afghanistan, Kouh Djaouz, Tang-Saidan; MNHN.

TYPE MATERIAL EXAMINED **Pakistan** Loralai District, 14 miles East of Ziarat, VI 1961, IMIFA (holotype and allotype of *Scorpiops kraepelini*), leg J Anderson, ZMUH
FURTHER MATERIAL EXAMINED **Pakistan** northern Baluchistan, VIII–IX 1965, leg S Minton, 3FA, det W D Sissom in 1986 as *Scorpiops (Euscorpiops) lindbergi* Two female are in MBCZ, one is in FKCP

DIAGNOSTIC CHARACTERS. Total length is 35.4–47 mm. Habitus is shown in Fig. 48 and Vachon, 1980: 156 fig. 33. Male has the fingers of pedipalps strongly flexed, whereas in the female they are straight. For position and distribution of trichobothria on the tibia and patella of pedipalps see Figs 18, 19, 44 and Vachon, 1980: 157 figs 34–39. Measurements of the carapace, telson, segments of the metasoma and segments of the pedipalps, and numbers of pectinal teeth are given in Table 1. There are 18 or 19 external trichobothria on the patella (5 eb, 2 esb, 2 em, 4–5 est, 4–5 et). Due to variable position of some trichobothria, the same trichobothrium may be in the position of est4 or et2 (Figs 18–19). Ventral trichobothria on the patella number 10–12. One examined female from Pakistan and the holotype of *S. kraepelini* have only 10 ventral trichobothria on one patella, whereas other examined specimens have 11 on both. Pectinal teeth number 6–9. The carapace is either smooth or bears very fine granules.

Overall coloration is yellow.

The manus of pedipalps dorsally bears fine granules forming a lattice and a central longitudinal strip

The surface of the mesosoma is uneven but without granules, and the posterior margins of its segments bear three inconspicuous median keels. The male (holotype of *S. kraepelini*) has a well discernible median keel. The anterior parts of mesosomal segments bear symmetrical depressions. The seventh mesosomal segment is ventrally smooth, but with four blunt, often vague keels

The dorsolateral keel of the third and fourth metasomal segments is posteriorly toothlike and terminates in a larger tooth.

COMMENTS. This species is based on two males and five females. Prof. Vachon apparently informed Lindgerg about his intention to describe the species as *Pareuscorpius lindbergi* and Lindberg (1961 31) published this information. However, the species was described by Vachon only in 1980 as *Scorpiops (Euscorpiops) lindbergi*.

Lourenço (1998: 246) based *Scorpiops kraepelini* on one male and one female. He stated that *S. kraepelini* has 17 external trichobothia on the patella (Lourenço 1998: 253 and fig. 7 on p. 248) and his figure omitted one esb trichobothrium. However, this trichobothrium is poorly developed only on the right patella of pedipalps of the holotype, whereas on the left patella of the holotype and on both patellas of the allotype it is clearly discernible (Fig. 19). Because of the above features in

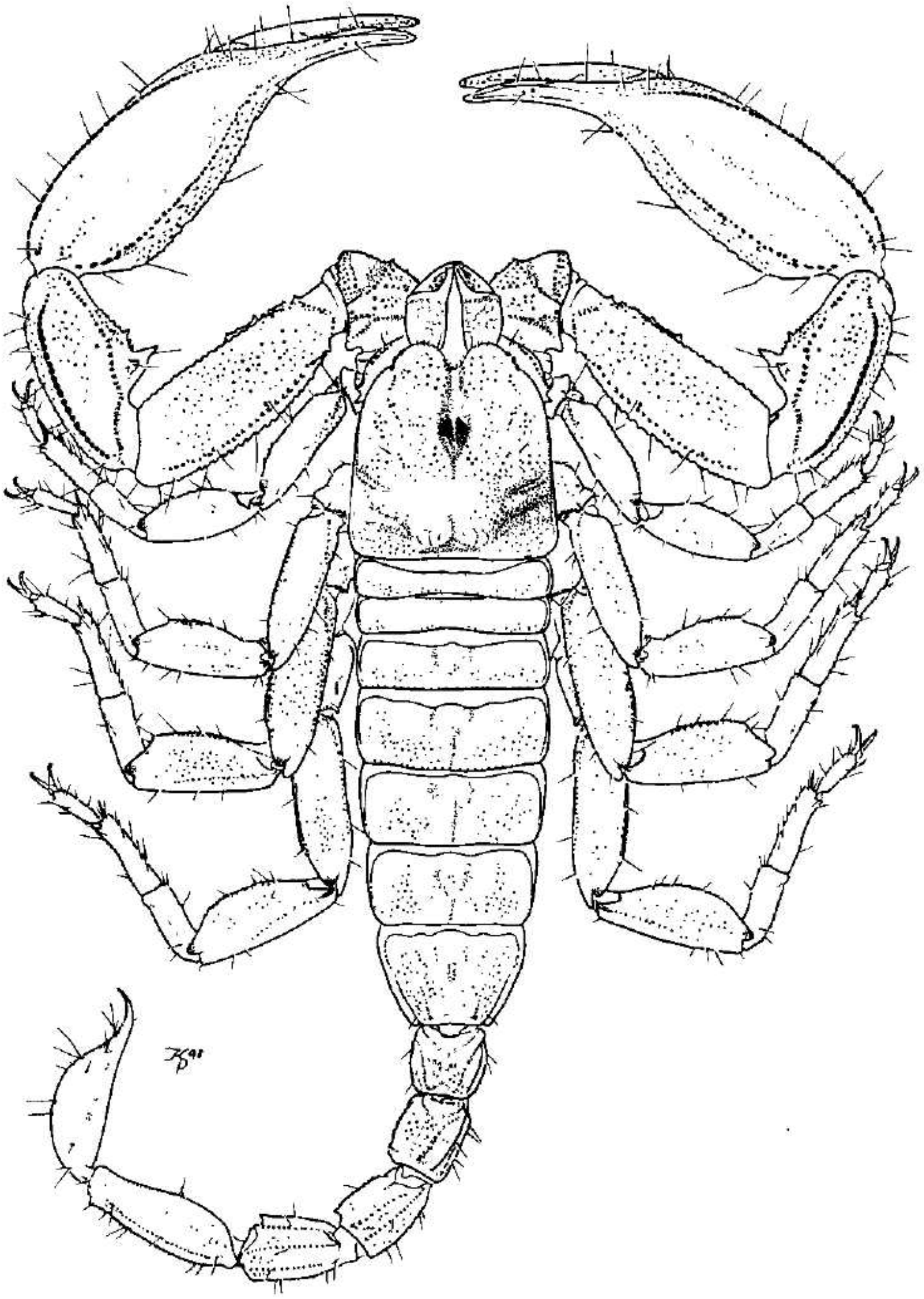


Fig 71. *Scorpiops montanus* Karsch, FKCP male, dorsal aspect.

common, especially the yellow coloration, presence of 11 ventral trichobothria on the patella (Lourenço 1998: 248 fig. 8), and the position of trichobothrium Eb3 on the external surface of the tibia between trichobothria Dt and Db (see Fig. 44 and Lourenço, 1998: 248 fig. 3), I am certain that *S. kraepelini* is a synonym of *S. lindbergi.*

Distribution. Afghanistan (Vachon 1980: 155), Pakistan (Lourenço 1998: 248).

Scorpiops longimanus Pocock, 1893

(Figs 20, 39, Tables 1–3)

Scorpiops longimanus Pocock, 1893: 326; Kraepelin, 1894 191; Kraepelin, 1899. 180; Pocock, 1900. 72, Birula, 1913 416; Henderson, 1913. 132; Kraepelin, 1913: 160, Werner, 1934. 283, Roewer, 1943. 236, Takashima, 1945. 98, Minnocci, 1974 42, Stahnke, 1974 117, Dupré, Lambert & Gérard, 1997 67
Scorpiops (Euscorpiops) longimanus longimanus Vachon, 1980. 155
Scorpiops (Euscorpiops) longimanus Tikader & Bastawade, 1983. 464; Bastawade, 1985: 261, Dupre, 1997: 2
Euscorpiops longimanus Kovařík, 1998. 141
? *Scorpiops (Euscorpiops) longimanus benghami* Vachon, 1980 155
Scorpiops flavimanus [sic]: Dupre, Lambert & Gérard, 1997. 49

Type locality and type deposition. Silhet; BMNH.

Material examined **India** Assam, Nageerat, 1FA, ZMUH, Sibsagar, 1MFA, ZMUH, Kobo, Abor. exped., 1FA, ZMUH, Kobo, VII 1913, 1M1FA, Mus Calcutta, ZMUH No 1564, Meghalaya state, East Khasi Hills, Umran (ca 800 m), 33 km N of Shillong, 29 VI–2 VII 1995, 1juv A, leg L Bartolozzi & K Werner, MZUF No 1715, Maghalaya state, West Garo-Hills, Nokrek Nat Park, ca 1100, 9–17 V 1996, 1F2juvsA, leg E Jendek & O Šauša, FKCP **Myanmar** Carin Hills, 900–1000 m, viaggio in Birmania, 20.X.1896, 2M1FA, leg L Fea, ZMUH, ober Birma, Samaguking, 1M1juv A, Mus Calcutta, X.1912, ZMUH

Diagnostic characters. Total length is 45–70 mm. Males have larger pectens, but fingers of pedipalps are straight and telsons narrow, prolonged in both sexes. For position and distribution of trichobothria on the tibia and patella of pedipalps see Figs 20, 39. Measurements of the carapace, telson, segments of the metasoma and segments of the pedipalps, and numbers of pectinal teeth are given in Table 1. There are 18 external trichobothria (5 eb, 2 esb, 2 em, 4 est, 5 et) (Fig. 20) and 9–11 ventral trichobothria on the patella (Fig. 28). Pectinal teeth number 6–9. The carapace bears sparse large granules.

The manus of pedipalps bears fine granules of equal size, which are more closely spaced in the center and in the remaining areas form a lattice. In the center of the manus there often is a pronounced longitudinal keel.

The mesosoma bears sparse smaller or larger granules and one median keel. The seventh mesosomal segment bears four keels which may not be well developed. The first metasomal segment bears 10 keels The second through fourth segments bear eight keels and two additional poorly developed keels. The fifth metasomal segment bears seven keels, of which only one ventral keel is serrate. A mediolateral keel is present but incomplete. All keels are composed of equidimensional granules of nearly equal size. Dorsolateral keels of the first four segments posteriorly terminate in a pronounced tooth.

Comments. *S. longimanus* is based on one female allegedly deposited at BMNH, but the specimen cannot be found. Kraepelin (1913) and Vachon (1974, 1980) regarded *S. binghamii* as a subspecies of *S. longimanus*, but Vachon's figure (1974: 942, fig. 226) lends some credence to the possibility that he based his conclusions on misidentified specimens.

Distribution Bangladesh, India (Arunachal Pradesh, Assam, Meghalaya) (Pocock 1893: 327, Tikader & Bastawade 1983: 470), Myanmar (Henderson 1913: 132).

Scorpiops margerisonae sp. n.

(Figs 66, 70, Tables 1–3)

TYPE LOCALITY AND TYPE DEPOSITION. China, Tibet; FKCP.

TYPE MATERIAL EXAMINED **China, Tibet**: 1MA (holotype), FKCP

ETYMOLOGY. Named after Janet Margerison-Knight, curator at the Natural History Museum, London, in appreciation of her kind help.

DIAGNOSTIC CHARACTERS. Total length of the male holotype is 51 mm. Measurements of the carapace, telson, segments of the metasoma and segments of the pedipalps, and numbers of pectinal teeth are given in Table 1. Habitus is shown in Fig. 70. For position and distribution of trichobothria on the tibia of pedipalps see Fig. 66. There are 17 external trichobothria (5 eb, 2 esb, 2 em, 4 est, 4 et) (Fig. 5) and 8 and 9 ventral trichobothria (Fig. 28) on the patella. Trichobothrium Eb3 on the external surface of the tibia is between trichobothria Dt and Db (Fig. 47). Pectinal teeth number 12–13. The carapace is finely but sparsely granulated, with larger and more closely spaced granules only in its anterior portion.

The base color is dark brown to black, with the manus of pedipalps, legs, and telson reddish brown.

The dorsal surface of the manus is flat, with a dense cover of equal-sized granules. The fingers of pedipalps in the male holotype are strongly flexed (Fig. 66).

The mesosoma bears larger and more closely spaced granules primarily in the posterior half of each segment, and has one pronounced median keel. The ventral surface of the seventh mesosomal segment is granulated and bears four conspicuous keels.

All keels on metasomal segments are composed of large, irregularly shaped granules. Spaces between the keels are more finely granulated. The dorsolateral keels on the first through fourth metasomal segments are composed of backward-inclined teeth that become larger posteriorly.

AFFINITIES. The described features distinguish *S. margerisonae* sp. n. from all other species of the genus *Scorpiops*. They are recounted in the key below. The number of pectinal teeth (12–13) is the highest in the genus.

Scorpiops margerisonae sp. n. is closest to *S. tibetanus* with which it shares the number of trichobothria on the tibia and patella of pedipalps, body proportions, and total length. It differs from *S. tibetanus* chiefly in having a dorsally flat manus of pedipalps, shorter metasoma (Table 1), and smaller telson.

Scorpiops montanus Karsch, 1879

(Figs 38, 41, 71, 72, Tables 1–3)

Scorpiops montanus Karsch, 1879: 107, Kraepelin, 1894 192 (in part), Kraepelin, 1899. 180 (in part), Pocock, 1900 70, Kraepelin, 1901. 273, Kraepelin, 1913 159, Fage, 1933 30, Werner, 1934 283, Takashima, 1945 97, Mani, 1959 12, Minnocci, 1974 42 (in part), Stahnke, 1974: 123; Tikader & Bastawade, 1977 144, Moritz & Fischer, 1980 319, Khatoon, 1986. 645; Goyffon, 1993. 246; Kovařík, 1993: 109; Kovařík, 1994 61, Kovařík, 1998 142

Scorpiops montanus: Simon, 1887 113

Scorpiops (Scorpiops) montanus Vachon, 1980: 151, Tikader & Bastawade, 1983: 429; Bastawade, 1992. 100

TYPE LOCALITY AND TYPE DEPOSITION. Himalaya; ZMHB.

TYPE MATERIAL EXAMINED **India** Himalaya, 1juv A (holotype), leg Trochnow, ZMHB No. 3064

FURTHER MATERIAL EXAMINED **India**. Ostindien, 1MA, ZMUH, Dehra Dun, 1893, 1FA, ZMUH; Hardwar, X 1912, 1M1F3juvsA, Mus Calcutta, ZMUH, Stararduru, X 1912, 1M2FA, Mus. Calcutta, ZMUH; Timli Siwalik, 18 VII 1956 Deutsche Indien-Expedition 1955–57, 2FA, ZMUH No 22, Uttar Pradesh Kumaon Hills, Bhimtal near Sattal 27 III 1973 1MA, 20–22 V 1973, 2M3F3juvsA, leg F Smetacek, ZMUH No 31, 34, 38, 41–2 45, 50 53, NW, Himachal Pradesh, Kulu Valley, Hurla Nal, Garsa (= Garsah), 1350–1450 m, IX–X 1982 21A, leg M L Azzaroli B Lanza & V Kumar MZUF, Himachal Pradesh, Bhutan, Kulu dist , 740 m 20 VII 1983, 2juvsA, leg M L Azzaroli & Simonetta, MZUF, Uttar Pradesh bor , 1990, 2M1FA FKCP, Rampur, 1992, 1ME, FKCP Uttar Pradesh bor Kotdwara env , 1F(im)E, 1–3 VIII 1994, leg M Snižek FKCP, Himalaya, Dehra Dun, *14 II 1998 2F, ZMUH*

DIAGNOSTIC CHARACTERS Total length is up to 60 mm The male has fingers of pedipalps strongly flexed (Fig 41), whereas in the female they are flexed only slightly Measurements of the carapace, telson, segments of the metasoma and segments of the pedipalps, and numbers of pectinal teeth are given in Table 1 Habitus is shown in Figs 71–72 For position and distribution of trichobothria on the tibia of pedipalps see Fig 38 There are 17 external trichobothria (5 eb, 2 esb, 2 em, 4 est, 4 et) (Fig 5) and 12–18 ventral trichobothria on the patella (Figs 26–27) The number of ventral trichobothria distinguishes *S montanus* from all other species of the genus *Scorpiops* that have, like *S montanus*, 17 external trichobothria on the patella of pedipalps (Fig 5) Pectinal teeth number 6–9

The carapace bears granules of unequal size, with a concentration of larger granules behind the lateral eyes There is a pronounced central depression in the anterior margin of the carapace

The manus of pedipalps bears unequal-sized granules, which in the center may be more packed and form a longitudinal strip Tubercles on the external surface of the patella are large, pointed, and thornlike

The mesosoma is granulated and bears one median keel, and sometimes also two vague additional keels that show little elevation and are not continuous The seventh mesosomal segment bears two or four poorly developed keels

All keels on metasomal segment are well developed and composed of equidimensional, nearly equal-sized granules The dorsolateral keels of the first four segments posteriorly terminate in pronouced teeth

COMMENTS This species is based on one immature specimen 32 mm long and deposited at ZMHB Tikader & Bastawade (1977 434) claim that they studied two specimens from the type series at BMNH, but it is not possible (see Karsch 1879 109)

Kraepelin (1894, 1899) was uncertain about the taxonomic position of this species and confused it with e g *S binghamii* For that reason his characterization of *S montanus* cannot be accepted and specimens so labeled have to be revised one by one

DISTRIBUTION India (Himachal Pradesh, Uttar Pradesh, Punjab) (Karsch 1879 107, Tikader & Bastawade 1983 429), Pakistan (Khatoon 1986 645)

Scorpiops oligotrichus Fage, 1933

(Tables 2, 3)

Scorpiops montanus oligotrichus Fage, 1933 30, Takashima, 1945 98
Scorpiops oligotrichus Fage 1944 73, Vachon, 1974 942, Kovařík, 1998 142, Lourenço, 1998 249
Scorpiops (Scorpiops) oligotrichus Vachon, 1980 151, Kovařík, 1993 109, Kovařík, 1994 65
Scorpiops montanus Fage, *1936 181*

TYPE LOCALITY AND TYPE DEPOSITION. Laos, Bana, Djirinh, MNHN

DIAGNOSTIC CHARACTERS Total length is 32–33 mm (Fage 1944 73) For position and distribution of trichobothria on the patella of pedipalps see Vachon (1974 942, fig 227) There are 17 external

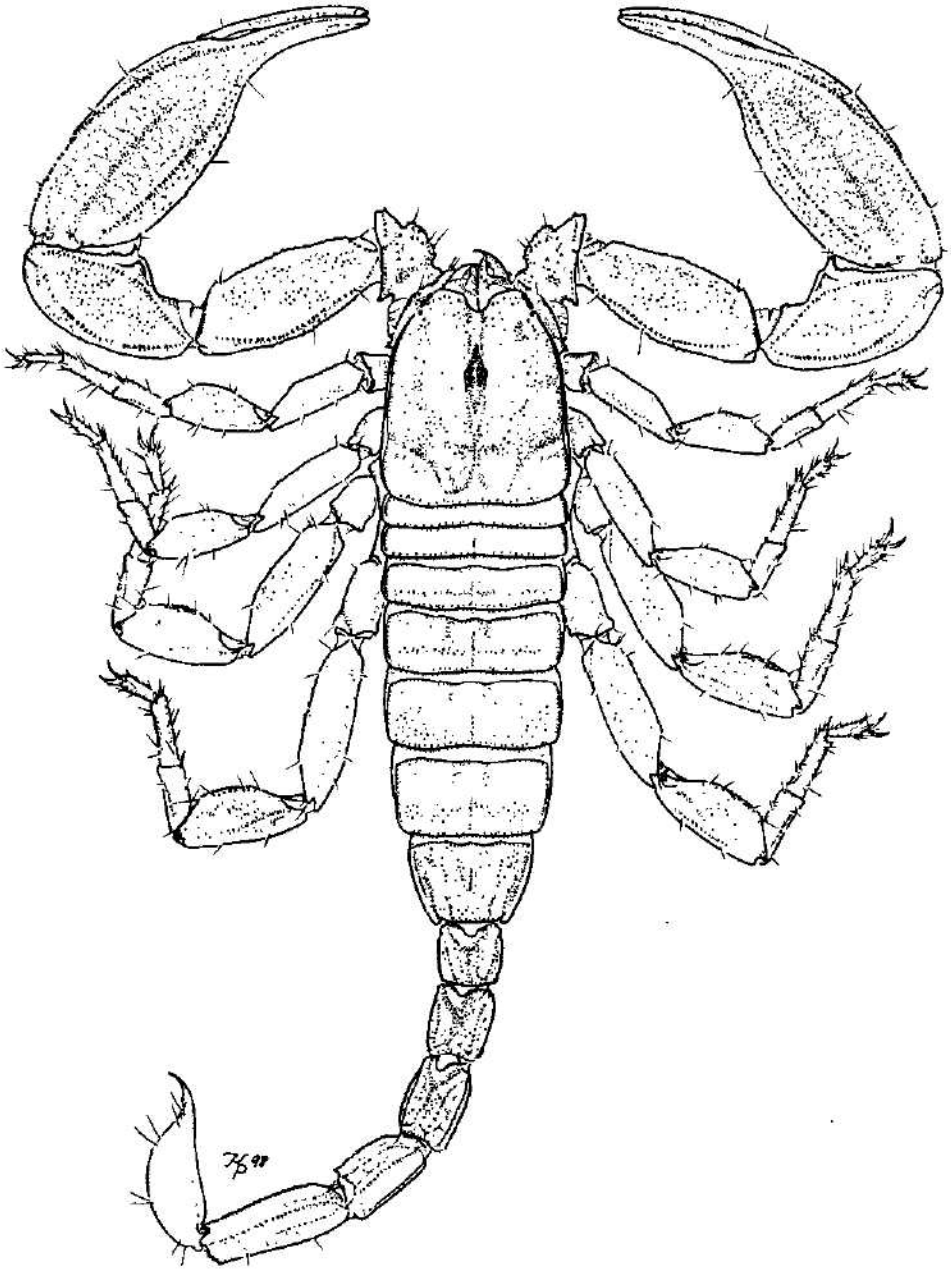


Fig. 72. *Scorpiops montanus* Karsch, FKCP female, dorsal aspect.

trichobothria (5 eb, 2 esb, 2 em, 4 est, 4 et) and 9 ventral trichobothria on the patella (Fage 1933: 30). Habitus is shown in Lourenço (1998. 249, fig. 10).

COMMENTS. This species is based on immature specimens collected in Laos (now Vietnam – Djiring and Bana) and originally regarded as a subspecies of *S. montanus*. In 1944, after seeing adult specimens from various localities in Laos and Vietnam (Pak Lay, Pak Sang, Luang Prabang), Fage raised it to the species level.

The characterization given by Fage (1944) is inadequate and lacks even features such as the number of pectinal teeth. Unfortunately, MNHN has not responded to my repeated requests for type specimens, and I have not been able to find other specimens of this species either. Therefore the diagnostic characters are based solely on the authors cited.

DISTRIBUTION. Laos, Vietnam (Fage 1933: 30, 1944: 73).

Scorpiops pachmarhicus Bastawade, 1992
(Tables 2–3)

Scorpiops (Scorpiops) pachmarhicus Bastawade, 1992: 100, Kovařík, 1994: 65; Lourenço, 1998: 246
Scorpiops pachmarhicus Kovařík, 1998: 142

TYPE LOCALITY AND TYPE DEPOSITION. India, Madhya Pradesh, Pachmarhi, 22°60'N, 78°50'E; NZSI.

DIAGNOSTIC CHARACTERS. Total length of the female holotype is 34.5 mm (Bastawade 1992: 100). For position and distribution of trichobothria on the tibia and patella of pedipalps see Bastawade (1992: 101, figs 6–8). There are 17 external trichobothria (5 eb, 2 esb, 2 em, 4 est, 4 et) and 10 ventral trichobothria on the patella (Bastawade 1992: 101). Pectinal teeth number 6 in the female and 7 in the male (Bastawade 1992. 102).

COMMENTS. This species is based on three mature females and one male obtained by D. F. Singh in August 1985 and October 1987 (Bastawade 1992: 102). The types have been deposited at NZSI. *S. pachmarhicus* is closest to *S. montanus*, from which it differs primarily in a more anterior position of the median eyes and in having 10 ventral trichobothria on the patella (Bastawade 1982: 101, fig. 7) rather than 12–18 as in *S. montanus* (Fig. 27).

Unfortunately, I have not been able to examine the types or any other specimens of this species, and the diagnostic characters are therefore based solely on Bastawade's description.

DISTRIBUTION. India (Madhya Pradesh) (Bastawade 1992: 102).

Scorpiops petersii Pocock, 1893
(Figs 35, 42, Tables 1–3)

Scorpiops hardwickii not Gervais, 1843 and 1844 Peters, 1862. 510, Karsch, 1879: 106 (syn. by Pocock, 1893: 323)
Scorpiops petersii Pocock, 1893: 323, Kraepelin, 1894: 190; Pocock, 1900: 70, Takashima, 1945: 98, Minnocci, 1974: 42, Kovařík, 1998: 142
Scorpiops petersi Kraepelin, 1899: 181, Pocock, 1899: 268; Kraepelin, 1901: 273, Kraepelin, 1913: 159, Stahnke, 1974: 117, Kovařík, 1994: 61
Scorpiops (Scorpiops) petersi petersi Vachon, 1980: 150
Scorpiops (Scorpiops) petersi Tikader & Bastawade, 1983. 446
? *Scorpiops petersi von-wicki* Birula, 1913: 417 (TL: Assam, Aboren-Gebirge), **syn. n.**
? *Scorpiops petersii von-wicki* Minnocci, 1974: 42.
? *Scorpiops (Scorpiops) petersi von-wicki*: Vachon, 1980: 150

TYPE LOCALITY AND TYPE DEPOSITION. Simla, in the Himalayas; BMNH.

TYPE MATERIAL EXAMINED **India (Himachal Pradesh)** Himalaya, Simla, 1MA (lectotype), leg Schlagintweit, BMNH
FURTHER MATERIAL EXAMINED **Bhutan** *Phuntsholing (Kamjee), 1957, 1FA, FKCP, Bhutan, 1972, 1M5F3juvsA, No* BS 002/1-9, 1juv A, BS 015/1, 3juvsA, No BS 013/1–3, NHMB, Phuntsholing, 200–400 m, 3M4F2juvsA, No BS 001/1–9, 2juvsA, No BS 014/1 2, 15 IV 1972, 1FA, No BS 003/1, 3M5F3juvsA, No BS 006/1–11, 1juv A, No BS 008/1, 1juv A, No BS 012/1, 21 –28 IV 1972, 1juv A, No BS 009/1, 6 V 1972, 21 1juv A, No BS 005/1–3, 3juvsA No BS 007/1–3, 1juv A, No BS 011/1, 13 V 1972, 2juvsA, NHMB, Khala, 200 m, 25 IV 1972, 1juv A, No *BS 010/1, NHMB, Samchi, 7–11 V 1972, 2F1MA, No BS 004/1 3, NHMB,* **Kharbandi**, *25 IV 1976, 1M1I 1juv A,* leg K Dorje, NHMB **India** 1MA, SMFD No 4415d, 1FE, FKCP, Himalaya, 5MA, leg Troetenow, ZMHB No 3063, W Himalaya Murree, 1MA, ZMUH, Burki, 1MA, Mus Calcutta, X 1912, ZMUH, 1893 1M, Mus Giessen, ZMUH, Simla, 1M1juv A, Mus Calcutta, X 1912, ZMUH, Himalaya, Chakrata, 1FA, Deutsche Indien-Expedition 1955–57 Nr 448, ZMUH No 09, Himalaya, Molta, 3 000 m, 26 V 1956, 1FA, Deutsche Indien-*Expedition 1955–57 Nr 416, ZMUH No 14, Himalaya, Molta, 3 000 m, 9 V 1956, 1FA, Deutsche Indien* Expedition 1955–57 Nr 389, ZMUH No 20, Himalaya, Molta, 3 000 m, 13 VI 1956, 1MA, Deutsche Indien-Expedition 1955 57 Nr 432, ZMUH No 17, Himalaya, Molta, Deutsche Indien-Expedition No 402, 1955–57, 1MA, FKCP, Dorjee Khandu, 3 IX 1975, 1M1IA, leg W Wittmer, NHMB, Sikkim, Darjeeling Distr, Kalimpong, 3 IV 1976, 1M1juv A, 25 IV 1976, 1M1F1juv A, 5 VII 1981, 1MA, No 141a, leg B Bhakta, NHMB, *Sikkim, Chhuba Khola near Sintan, 25 IV 1977, 1juv A, leg B Bhakta, NHMB, Sikkim, Pelling, 1400 m, 10 IV* 1978, 1juv A, leg B Bhakta, No 141b, labelled *Scorpiops* (*Scorpiops*), det M Vachon 1980 (VA 2599), and labelled *Scorpiops asthenurus*, NHMB, Kashmir, Dachigan, VI 1980, 1MA, FKCP, Uttar Pradesh bor, Haridvar, Chila, 300 m, 1ME, 5 –14 VIII 1994, leg M Valenta, FKCP, Kashmir, Pahalgan, 1FE, VII 1995, leg R Sauer FKCP, Meghalaya state, West Garo Hills reg, TURA, 5–7 V 1996, 1FA, ca 700m, GPS (global positioning system) *N25 30 7 E90 13 9, WGS (world graphic system) 84, leg E Jendek & O Šauša, FKCP, NE, Maghalaya state, West* Garo-Hills, Nokrek Nat Park, ca 1100, 9 –17 V 1996, 1juv A, leg E Jendek & O Šauša, FKCP, Dehra Dun, 14 II 1998, 1M1FA, ZMUH **Pakistan** Gine (Chilas), 16 VI 1981, 1FA, leg P Letellier, FKCP, Himalaya mts, Kaghan valley, Thathabaya 2200 m, 73°26'E, 34°36'N, 1 V 1998, leg M Lazslo & G Ronkay, 1MA, HNHM, 1MA, FKCP

DIAGNOSTIC CHARACTERS. Total length is up to 75 mm. In contrast to female, the male has fingers of pedipalps strongly flexed (Fig 42) Measurements of the carapace, telson, segments of the metasoma and segments of the pedipalps, and numbers of pectinal teeth are given in Table 1 For position and distribution of trichobothria on the tibia of pedipalps see Fig 42 Positions of ventral trichobthria on the patella and of external and dorsal trichobothria on the tibia are variable There are 17 external trichobothria (5 eb, 2 esb, 2 em, 4 est, 4 et) (Fig. 5) and 7, or rarely 6 or 8, ventral trichobothria on the patella (Fig. 29) Pectinal teeth number 4–9

The carapace is granulated, but not densely.

The mesosoma is granulated and bears one median keel, sometimes with two additional, weakly marked and interrupted keels (ZMHB males) The granules on mesosomal segments are widely spaced, with the distance between them far greater than their size The seventh mesosomal segment ventrally bears four conspicuous keels

The telson is strongly inflated, especially in males

COMMENTS. This species is based on two specimens which Pocock (1893 325) thought to be females A label enclosed to the examined specimen shows that Stahnke designated it the lectotype and again marked as a female However, I am certain it is an adult male, which in contrast to the female has the fingers of pedipalps markedly flexed (Fig 42)

Examination of a number of specimens has shown considerable variation in number of pectinal teeth (4–9) and ventral trichobothria on the patella (6–8, usually 7), and in the position of certain trichobothria, mainly esb, em, est1, est3 and et2, on the patella (Fig. 5) and Esb, Eb (including Eb3), Est5 and dsb on the tibia (Fig. 2) It is therefore necessary to re-evaluate the characters used in distinguishing this species from others in the genus *Scorpiops*.

The holotype female of *S petersii vonwicki* is supposedly deposited at the Zoological Institute of Russian Academy of Sciences, St. Petersburg, but cannot be located and may have been *permanently lost Since Birula's description does not contain truly diagnostic characters and the* available literature does not mention any other specimens, I believe this subspecies to be most likely invalid.

Distribution. Bhutan, India (Assam, Himachal Pradesh, Uttar Pradesh, Kashmir, Meghalaya , Sikkim) (Pocock 1893: 325, Vachon 1980: 150, Tikader & Bastawade 1983: 446), Pakistan (first report)

Scorpiops problematicus sp. n.

(Figs 21, 40, 64, 65, Tables 1–3)

? *Scorpiops longimanus benghami*: Vachon, 1974 942
? *Scorpiops (Euscorpiops) longimanus benghami* Vachon, 1980. 155
Scorpiops (Euscorpiops) longimanus Kovařík, 1993 113; Kovařík, 1995 200.

Type locality and type deposition. Thailand, prov. Chiang Mai, Doi Pui mt., 18°49'N–98°54'E; FKCP.

Type material examined **Thailand** prov Chiang Mai, Suthep-Pui, 20 IV.1991, 1FE (allotype), 1M(im.)E (paratype No 2), leg J Farkač, FKCP, Doi Chiang Dao, 1800 m, V 1991, 1M(im.)E (paratype No 1). leg. D Král, FKCP; prov Chiang Mai, Doi Pui mt , 18°49'N–98°54'E, 1000–1600 m, 9 V 1996, 1ME (holotype), leg S Bečvář, FKCP, Mt Doi Pui near Chiang Mai, 900–1100 m, 11 V 1997, 3juvsA (paratype Nos 4–6), leg S Bečvář j and s , FKCP, Chiang Mai, 11 VI 1997, 1juv.A (paratype No 3), leg. M. Snižek, FKCP

Etymology. The name alludes to the problems encountered in defining taxonomic position of this species, the type series of which was originally regarded as *Scorpiops longimanus* (viz also comments under *S binghamii*).

Diagnostic characters. Total length is 45.8 mm (male holotype) to 46.7 mm (female allotype). The male has a larger pecten than the female. Fingers of pedipalps are flexed and the telson long and narrow in both sexes. For position and distribution of trichobothria on the tibia and patella of pedipalps see Figs 21, 40, 64–65. Measurements of the carapace, telson, segments of the metasoma and segments of the pedipalps, and numbers of pectinal teeth are given in Table 1. External trichobothria on the patella number 19 (5 eb, 2 esb, 2 em, 5 est, 5 et) (Fig. 21), with the position of est5, et2, and et3 being somewhat variable. Ventral trichobothria on the patella number 11–12, with 12 only in paratype No. 1 and on one patella of paratype No. 6. Pectinal teeth number 7–8. The carapace is granulated, with the granules being larger anteriorly.

The manus of pedipalps dorsally bears fine granules of equal size, which in the central part are more closely packed and form a longitudinal keel, whereas elsewhere they form a lattice.

The mesosoma is granulated, with the granules being larger and more numerous in the posterior part of each segment. There is one median keel, and the seventh segment bears four inconspicuous keels. Keels on metasomal segments consist of fine granules of equal size. Only the dorsolateral keel is pronounced, serrate, and terminates in a large tooth.

Affinities. The described features distinguish *S. problematicus* sp n. from all other species of the genus *Scorpiops*. They are recounted in the key below.

S problematicus sp. n. is closest to *S. longimanus* and *S binghamii*, with which it has often been confused. It differs from these two species in the number and distribution of external trichobothria on the patella (see key). In contrast to *S. longimanus*, the fingers of pedipalps are flexed in both sexes.

Scorpiops rohtangensis Mani, 1959

(Tables 2, 3)

Scorpiops rohtangensis Mani, 1959: 15; Minnocci, 1974: 42, Polis, 1990 252, Goyfon, 1993 246, Kovařík, 1998 142

Scorpiops (Scorpiops) rohtangensis. Vachon, 1980 151; Tikader & Bastawade, 1983 435, Kovařík, 1994: 65.

TYPE LOCALITY AND TYPE DEPOSITION. Himalaya, Rohtang Pass, 4300 m, North Aspect of Pir Panjal Range (Lahaul); NZSI.

DIAGNOSTIC CHARACTERS. Total length of the male holotype is 50 mm (Mani 1959: 15) or 37.75 mm (Tikader & Bastawade 1983: 435). For position and distribution of trichobothria on the tibia and patella of pedipalps see Tikader & Bastawade (1983 438, figs 1211–1216). There are 17 external trichobothria (5 eb, 2 esb, 2 em, 4 est, 4 et) and 7 ventral trichobothria on the patella (Mani 1959: 15). Pectinal teeth number 6–7 (Mani 1959: 15) or 6 (Tikader & Bastawade 1983: 439). The mesosoma lacks a keel (Tikader & Bastawade 1983: 439).

COMMENTS. This species is based on a single male obtained by M. S. Mani in June 1954 at 4300 m elevation. The type has been deposited at NZSI (No. 3087/18). Mani (1959: 15) and Tikader & Bastawade (1983: 435–440) produced differing descriptions (see diagnostic characters) of the holotype, which is the only known specimen.

Unfortunately, I have not been able to examine the type, and the diagnostic characters are therefore based solely on the authors cited. The purported absence of a median mesosomal keel is questionable (it is present in fig. 1201 of Tikader & Bastawade 1983: 437). Although the information provided by Tikader & Bastawade (1983: 406) is included in the key below, a future examination of the holotype may show that *S rohtangensis* is a synonym, most likely of *S. petersii*.

DISTRIBUTION. India (Punjab) (Mani 1959: 15).

Scorpiops sejnai sp. n.

(Figs 22, 43, 67, Tables 1–3)

TYPE LOCALITY AND TYPE DEPOSITION. Vietnam, Bach-ma Nat. Park, 1200 m, 16°10' N–107°54' E; FKCP.

TYPE MATERIAL EXAMINED **Vietnam** Bach-ma Nat Park, 1200 m, 16°10' N–107°54' E, 26 VII–6 VIII 1996, 1ME (holotype), leg V Siniaev & E. Afonin, FKCP, Bach Ma, III.1997, 2im 4juvsA (paratypes Nos 1–6), leg. V Šejna, FKCP.

ETYMOLOGY Named after Vladimír Šejna of Prague, who collected most of the specimens.

DIAGNOSTIC CHARACTERS. Total length of the male holotype is 42.6 mm. The female is not known. The male has a large pecten, relatively wide telson, and slightly flexed fingers of pedipalps (Fig. 43). In immature males the fingers are straight. Measurements of the carapace, telson, segments of the metasoma and segments of the pedipalps, and numbers of pectinal teeth are given in Table 1. For position and distribution of trichobothria on the tibia and patella of pedipalps see Figs 22, 43, 67. External trichobothria on the patella number 18 (5 eb, 2 esb, 2 em, 4 est, 5 et) (Fig. 22) and their positions do not appear to vary. Trichobothrium et2 is placed more toward the center and could also be regarded as an est trichobothrium. Ventral trichobothria on the patella number 9 (Fig. 28). Pectinal teeth number 4–7. Granulation of the carapace is very fine.

The manus of pedipalps dorsally bears fine granules of equal size, which in the center are more closely packed and form a keel, whereas elsewhere they form a lattice. The internal surface of the manus bears long, slender thorns with blunt tips.

The mesosoma is covered with minute granules and bears one inconspicuous, blunt median keel. The seventh mesosomal segment ventrally bears four weakly marked keels.

Keels on metasomal segments are composed of fine granules. Only the dorsolateral keel is pronounced and serrate, with teeth of unequal size.

AFFINITIES. The described features distinguish *S. sejnai* sp. n. from all other species of the genus *Scorpiops*. They are recounted in the key below.

Scorpiops sejnai sp. n. is closest to *S. longimanus* and *S. asthenurus*, from which it differs in the shape of the manus of pedipalps (Fig. 67, Table 1) and in the position of trichobothrium et2 on the patella (see Figs 22, 15, and 20). The male of *S. asthenurus* has the fingers of pedipalps strongly flexed, the male of *S. sejnai* sp. n. has them only slightly flexed, and examined specimens of *S. longimanus* lack any flexure. *S. asthenurus* has a keel with several granules behind the lateral eyes, whereas *S. sejnai* sp. n. lacks such a keel.

Scorpiops tibetanus Hirst, 1911

(Figs 47, 68, 69, Tables 1–3)

Scorpiops tibetanus Hirst, 1911: 472; Takashima, 1945: 99; Minnocci, 1974: 42; Kovařík, 1998: 142
Scorpiops (Scorpiops) tibetanus: Vachon, 1980: 151; Kovařík, 1994: 61

TYPE LOCALITY AND TYPE DEPOSITION. Tibet, Tsangpo Valley, Chaksam Ferry; BMNH.

TYPE MATERIAL EXAMINED. **China (Tibet)**: Chaksam Ferry, Tsangpo Valley, 1MA (holotype), leg. L. A. Wadell, BMNH No. 1911.8.10.1.

FURTHER MATERIAL EXAMINED. **China (Tibet)**: 2FA, MZUF No. 1755, Lhasa, 3700 m, 2M1F1juvE, 18.VI.1995, leg. Wrzecionko, FKCP; Tibet centr., Schigadze, 4000 m, 8.VI.1996, 3M7F4juvsE, leg. Paulus, FKCP; ?, Kambu batsi, 12.IV.1939, 1M6F9juvsA, leg. Nachlass Erdmann, SMFD.

DIAGNOSTIC CHARACTERS. Total length is 50–65 mm. The male has fingers of pedipalps more flexed (Fig. 47) and manus shorter and broader than the female (Figs 68–69). Measurements of the carapace, telson, segments of the metasoma and segments of the pedipalps, and numbers of pectinal teeth are given in Table 1. For position and distribution of trichobothria on the tibia of pedipalps see Figs 47, 68–69. There are 17 external trichobothria (5 eb, 2 esb, 2 em, 4 est, 4 et) (Fig. 5) and 7–10 (usually 9, in one young 7 on one side) ventral trichobothria on the patella. Pectinal teeth number 5–11. The carapace is sparsely and finely granulated, sometimes with granules forming anteromedian keels in front of the median eyes.

The mesosoma is granulated chiefly in the posterior half of each segment and bears one median keel. The seventh mesosomal segment ventrally bears four conspicuous keels.

All keels on metasomal segments are composed of large, irregularly shaped granules. Spaces between the keels are finely granulated.

COMMENTS. *Scorpiops tibetanus* is based on a male (Hirst 1911: 472) which I have examined. The total length is 60.4 mm, ventral trichobothria on the patella number 8, and pectinal teeth number 7 or 8. The carapace is granulated, but not densely, and the granules are larger in the anteromedial part. This male was studied in 1980 by Vachon, who assigned it No. VA 2491.

This species is related to *S. hardwickii*, from which it differs in having a longer and narrower manus of pedipalps in the female, a higher number of ventral trichobothria on the patella of pedipalp, and a higher number of pectinal teeth.

DISTRIBUTION. China (Tibet) (Hirst 1911: 473).

Key to scorpiopid genera and species

1. With 2 pairs of lateral eyes .... *Parascorpiops montanus* Banks
– With 3 pairs of lateral eyes 2
2 External trichobothria on patella number more than 50. .... *Dasyscorpiops grandjeani* Vachon
– External trichobothria on patella number less than 30 3
3 Ventral trichobothria on manus number 10–12 (Fig. 24) .... *Alloscorpiops* Vachon 6

– Ventral trichobothria on manus number 3 or 4 (Figs 3, 25) 4
4 External trichobothria on patella number 22–27 (Figs 9–12) ..... *Neoscorpiops* Vachon 7
– External trichobothria on patella number 17–21 (Figs 5, 14–22) ..... *Scorpiops* Peters 5
5 External trichobothria on patella number 17 (Fig. 5) 9
– External trichobothria on patella number 18–21 (Figs 15, 16, 18–22) 25
6 Ventral trichobothria on patella number 16–19 (Fig. 26). Pectinal teeth number 10–11 ..... *Alloscorpiops anthracinus* (Simon)
– Ventral trichobothria on patella number 15. Pectinal teeth number 8. ..... *A. lindstroemii* (Thorell)
7 External trichobothria on patella number 22–25 (Figs 10–12) Ventral trichobothria on patella number 12–15 8
– External trichobothria on patella number 26–27 (Fig. 9). Ventral trichobothria on patella number 15–18 ..... *Neoscorpiops deccanensis* (Tikader & Bastawade)
8 External trichobothria on patella number 22–23 (Figs 10–11). ..... *N satarensis* (Pocock)
– External trichobothria on patella number 25 (Fig. 12). ..... *N tenuicauda* (Pocock)
9 Ventral trichobothria on manus number 4 (Fig 3) 10
– Ventral trichobothria on manus number 3 (Fig 25) ..... *Scorpiops irenae* Kovařík
10 Ventral trichobothria on patella number 6–10 (Figs 28–29) 11
– Ventral trichobothria on patella number 12–18 (Fig. 27). ..... *S montanus* Karsch
11. Manus of tibia narrow and long Adult male tibia length to manus width ratio higher than 2.6. 12
– Manus of tibia wide and short Adult male tibia length to manus width ratio lower than 2.5. 20
12 Ventral trichobothria on patella number 6–9 (Figs 28–29). 13
– Ventral trichobothria on patella number 10. ..... *S pachmarhicus* Bastawade
13. Ventral trichobothria on patella number 6–8 (Fig. 29). 15
– Ventral trichobothria on patella number 9 (Fig 28). 14
14 Male manus length to manus width ratio 4 . 3 ..... *S oligotrichus* Fage
– Male tibia length to manus width ratio 6 6 3 ..... *S. farkaci* Kovařík
15. Adult male tibia length to manus width ratio higher than 6 ..... *S bhutanensis* Tikader & Bastawade
– Adult male tibia length to manus width ratio lower than 4. 16
16 Dorsal surface of mesosoma without keel. ..... *S rohtangensis* Mani
– Dorsal surface of mesosoma with keel 17
17. Male fingers of pedipalps flexed (Fig 41). Total length 60–70 mm. ..... *S petersii* Pocock
– Male fingers of pedipalps straight (Fig 37). Total length 35–58 mm. 18
18 Male tibia length to manus width ratio higher than 3.5. ..... *S leptochirus* Pocock
– Male tibia length to manus width ratio lower than 3.2 19
19 Total length 35–41 mm Male tibia length to manus width ratio higher than female (male about 3.1, female about 2.3) (Figs 50–51, Table I) ..... *S dastychi* sp. n.
– Total length 45–55 mm. Male tibia length to manus width ratio nearly same as female (about 2.9–3.1) (Figs 54 55, Table I). ..... *S feti* sp n
20 Pectinal teeth number 12–13 ..... *S. margerisonae* sp n
Pectinal teeth number 4–11 21
21 Total length more than 65 mm. ..... *S petersii* Pocock
– Total length less than 65 mm 22
22 Fingers of pedipalps in adults more or less flexed (Figs 32 or 41). 23
– Fingers of pedipalps straight in both sexes (Fig. 36). ..... *S jendeki* Kovařík stat. n.
23 Male tibia length to manus width ratio 2.3 ..... *S braunwalderi* sp n
- Male tibia length to manus width ratio lower than 2.2. 24
24 Pectinal teeth number 4–7, ventral trichobothria on patella number 6–7 or rarely 8, female tibia length to manus width ratio lower than 2.3 ..... *S hardwickii* (Gervais)
– Pectinal teeth number 5–11 (very rarely 5–6), ventral trichobothria on patella number 8–10 or very rarely 7, female tibia length to manus width ratio higher than 2.4 ..... *S. tibetanus* Hirst
25 External trichobothria on patella number 20–21 (5 eb, 2 esb, 2 em, 6 est, 5-6 et). See Fig. 16 ..... *S binghamii* Pocock
– External trichobothria on patella number 18–19 (Figs 18–22) 26
26. External trichobothrium Eb3 on tibia situated between trichobothria Dt and Est (Fig 31), may be nearly on level of Dt (Fig 43) 27
– External trichobothrium Eb3 on tibia situated between trichobothria Dt and Db, very close to Eb1-2 and Esb (Fig 44) ..... *S lindbergi* Vachon
27 External trichobothria on patella number 19 (Fig 21). 28

– External trichobothria on patella number 18 (Fig. 15) 29

28. Ventral trichobothria on patella number 13. Tibia length to manus width ratio higher than 4. .... *S. kaftani* Kovařík

– Ventral trichobothria on patella number 11. Tibia length to manus width ratio lower than 3.5 .... *S. problematicus* sp. n.

29. Tibia length to manus width ratio 2.75. .... *S. sejnai* sp. n.

– Tibia length to manus width ratio higher than 3.1. 30

30. Total length 35.9–45 mm. Ventral trichobothria on patella number 8 or 9. .... *S. asthenurus* Pocock

– Total length 45–70 mm. Ventral trichobothria on patella number 9–12. .... *S. longimanus* Pocock

Checklist of family Scorpiopidae Kraepelin, 1905

- ***Alloscorpiops*** Vachon, 1980
  - *Alloscorpiops anthracinus* (Simon, 1887)
  - *Alloscorpiops lindstroemii* (Thorell, 1889)
  - = *Scorpiops lugubris* Thorell, 1889
- ***Dasyscorpiops*** Vachon, 1974
  - *Dasyscorpiops grandjeani* Vachon, 1974
- ***Neoscorpiops*** Vachon, 1980
  - *Neoscorpiops deccanensis* (Tikader & Bastawade, 1977)
  - *Neoscorpiops satarensis* (Pocock, 1900)
  - *Neoscorpiops tenuicauda* (Pocock, 1894)
- ***Parascorpiops*** Banks, 1928
  - *Parascorpiops montanus* Banks, 1928
- ***Scorpiops*** Peters, 1862
- = *Scorpiops* (*Euscorpiops*) Vachon, 1980 **syn. n.**
  - *Scorpiops asthenurus* Pocock, 1900
  - *Scorpiops bhutanensis* Tikader & Bastawade 1983
  - *Scorpiops binghamii* Pocock, 1893
  - *Scorpiops braunwalderi* **sp. n.**
  - *Scorpiops dastychi* **sp. n.**
  - *Scorpiops farkaci* Kovařík, 1993
  - *Scorpiops feti* **sp. n.**
  - *Scorpiops hardwickii* (Gervais, 1843)
  - = *Scorpiops solidus* Karsch, 1879
  - = *Scorpiops affinis* Kraepelin, 1898 **syn. n.**
  - = *Scorpiops crassimanus* Pocock, 1899 **syn. n.**
  - = *Scorpiops insculptus* Pocock, 1900 **syn. n.**
  - = *Scorpiops austerus* Hirst, 1911
  - = *Chaerilus pirpanjalus* Mani, 1959
  - *Scorpiops irenae* Kovařík, 1994
  - *Scorpiops jendeki* Kovařík, 1994 **stat. n.**
  - *Scorpiops kaftani* Kovařík, 1993
  - *Scorpiops leptochirus* Pocock, 1893
  - *Scorpiops lindbergi* Vachon, 1980
  - = *Pareuscorpius lindbergi* Lindberg, 1961 (nomen nudum)
  - = *Scorpiops kraepelini* Lourenço, 1998 **syn. n.**
  - *Scorpiops longimanus* Pocock, 1893
  - *Scorpiops margerisonae* **sp. n.**
  - *Scorpiops montanus* Karsch, 1879
  - *Scorpiops oligotrichus* Fage, 1933
  - *Scorpiops pachmarhicus* Bastawade, 1992
  - *Scorpiops petersii* Pocock, 1899
  - = ? *Scorpiops petersi von-wicki* Birula, 1913 **syn. n.**
  - *Scorpiops problematicus* **sp. n.**
  - *Scorpiops rohtangensis* Mani, 1959
  - *Scorpiops sejnai* **sp. n.**
  - *Scorpiops tibetanus* Hirst, 1911

DISCUSSION

The family Scorpiopidae has been accepted only recently The first researcher to state in print that the inclusion of Scorpiopsinae in the Vaejovidae is not correct was Stockwell (1989 119), who also elevated all subgenera of the genus *Scorpiops* to separate genera His conclusions were formally confirmed by Lourenço (1998 245), and with the exception of validity of the genus *Euscorpiops* (see above) I concur with them

Understanding of sexual dimorphism has proven important to differentiating among the *Scorpiops* species Identification of certain specimens, especially females, remains a problem however, and it is often impossible to identify juveniles A major aspect of the dimorphism is the shape of the manus of pedipalps, which is often quite different in juvenile specimens

Relatively large numbers of specimens are available for certain species, and their examination has revealed variation in the numbers of pectinal teeth and of ventral trichobothria on the manus For instance in *S tibetanus* and *S hardwickii* sexual dimorphism (here the difference in the shape of the manus of pedipalps concerns not the male but the female) demonstrates clearly that they are separate species, whereas other characters are transitional and some may overlap (see number of pectinal teeth in Tab 3) These two species are closely related

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BOOK REVIEW

HARRISON F. W., LOCKE M. (vol. eds.): **Insecta**. In: HARRISON F. W. (treatise ed.): **Microscopic Anatomy of Invertebrates**. Wiley-Liss, A John Wiley & Sons Publication, New York, Chichester, Weinheim, Brisbane, Singapore, Toronto. 1998. Volumes 11A, 11B, 11C 1296 pp. Format 175×255 mm. Hardbound, price Lstg 520 – *ISBN 0-471 15955-7 (3-part set)*

This 3-part set is the eleventh representative of a series of encyclopaedic monographs published in 15 volumes under the editorship of F. W. Harrison. As the editor emphasizes in the preface to the treatise, although chapters might begin with a short treatment of external or gross anatomy, the body of each chapter is devoted to microscopic anatomy, particularly to cellular studies at the ultrastructural level. The list of contributors (including the volume editor M. Locke) comprises 46 acknowledged experts in the field. The volume editor states in the preface that in the science of insect structure every glimpse down the microscope, every micrograph of the cell, presents an answer waiting for a question. Relating the structure of cells to their behaviour is more fundamental, close to physics and chemistry, but no less interesting and just as much fun. This volume is organized into 3 parts composed of 3 books which contain 47 chapters in all condensed in 12 thematic blocks. Each chapter in supplied with an extensive list of references.

Volume 11A consists of 15 chapters (1 through 15) condensed in 3 thematic blocks. It opens with chapters delineating specializations of insect cells. Discussed are the basal laminae, connective tissue, cell associations, and reticular systems and intracellular lymph spaces. In following chapters depicted are the surface integument and epidermal derivates, notably the epidermis, the cuticle as an exoskeleton, the significance of insect cuticle, the ultrastructure and morphogenesis of insect epidermal gland cells, lenticles and silk glands. Cuticle specializations feature hairs, bristles and scales, structures for fine-particle feeding in aquatic larvae, tracheae and tracheoles, gills, and the anatomy of light production.

Volume 11B contains 19 chapters (16 through 34) condensed in 5 thematic blocks. Outlined are sense organs, namely the integumenal mechanoreceptors, sensilla and compound eyes. Nervous systems include insect neuroglia, neurosecretion, insect neuron and the network of neurosecretory endings. Chapters devoted to movement cover muscle structure and muscle insertions. Internal metabolism is presented by detailed exploration of the open haemolymph system of holometabolous insects and its relation to the tracheal system, accessory pulsatile organs, the fat body, and pericardial cells. The gut and associated organs feature the foregut, the midgut, the peritrophic membrane, hindgut with rectum, Malphigian tubules and labial kidney.

Volume 11C contains 13 chapters (35 through 47) condensed in 4 thematic blocks. Male reproduction deals with the spermatozoa, female reproduction incorporates structure, type and phylogeny of the ovariole, vitellogenesis, developmental biology of insect ovaries and structure of the egg. Endocrine glands present the corpora allata, the development in neuroendocrine systems, and prothoracic glands in lepidopterans. Insects for experiments focus on tissues and cells in culture, viruses in insect cells, gap junctions, Golgi complexes, and the portasomes – particles attached to the cytoplasmic face of the apical membrane of insect transporting epithelia. The volume concludes with a glossary relating to terms as they apply to described structures in insects, and with comprehensive taxonomic and volume indexes.

Three parts of this prestigious 15 volumes reference work provide most comprehensive and most up-to-date summary of fine anatomy of insects. It is extensively augmented by excellent illustrations presenting line drawings, three dimensional models, transmission or scanning electron micrographs and freeze-fracture replicae. Many of them constitute full-page plates composed of several pictures.

Jindřich Jíra

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An addition to the earthworm fauna of the Czech Republic

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Abstract Four species and subspecies of earthworms, namely, *Aporrectodea limicola* (Michaelsen 1890) *A rosea bimastoides* (Cognetti, 1901), *Dendrobaena pygmaea* (Savigny, 1826) and *Proctodrilus opisthoductus* Zicsi, 1985, are newly recorded from the Czech Republic Short descriptions of these taxa are given together with data on their distribution and ecology

Distribution, earthworms, Lumbricidae, Czech Republic

INTRODUCTION

Earthworms have been intensively studied in the Czech Republic since the early eighties (Houškova 1989, Pižl 1986, 1992, Pižl & Houškova 1994), and Pižl (1994) published a provisional list of 48 species and subspecies known to be representatives of the Czech earthworm fauna Despite of this fact, only several areas have been fairly well investigated, and a large part of the country remained completely unexplored so far

Hence, several faunistic and biogeographic projects on earthworms have been undertaken by the Institute of Soil Biology ASCR in 1994–1997 In the course of conducting a series of surveys of the earthworm faunas in relatively undisturbed areas of North Bohemia and Moravia I collected four taxa new for the fauna of the Czech Republic

MATERIAL AND METHODS

More than one hundred sites located in the Česke Švycarsko and Podyji National Parks in the Palava Biosphere Reserve and Protected Landscape Area, and in the Slezske Beskydy Mts were sampled for earthworms in 1984 1997 from which 12 042 specimens were obtained Both qualitative and quantitative sampling methods were used in all areas under study Qualitatively earthworms were collected either by digging and handsorting, or by searching leaf litter, mosses, rotting logs and/or other structural parts of the biotopes to obtain species exhibiting various associations with the environment For the quantitative studies, soil samples were collected and heat extracted for earthworms in a modified Kempson apparatus The lumbricids were preserved in 10% formalin and are deposited in the author's collection at the Institute of Soil Biology, Česke Budějovice

Code numbers given in parentheses behind the names of localities indicate respective quadrangles on the faunistic map of the Czech Republic (see Buchar 1982)

RESULTS

Aporrectodea limicola (Michaelsen, 1890)

(Fig 1)

Description Length 40–100 mm, diameter 3–4 mm, segment number 86–146 Body cylindrical, anterior part somewhat enlarged Colour pink anteriorly, grey posteriorly, unpigmented Prostomium epilobous. First dorsal pore in furrow 4/5. Spermathecal pores paired in furrows 9/10/11 between setal lines cd. Male pores on segment 15, between setal lines b and c on distinct tumescences that extend across furrows 14/15 and 15/16. Clitellum on (28) 29–35 (36), saddle-shaped. Tubercula pubertatis present on the two adjacent segments 33 and 34 between setal lines b and c, in form of individual papillae or a continuous ridge devided by fine shallow groove at furrow 33/34. Setae closely paired, post-clitellar formula aa:ab:bc:cd:dd = 6:1.2:4:1:19. Genital tumescences present around setae ab or all of segments 9–14,16,17 and 25–38.

Septa 6/7–9/10 thickened. Seminal vesicles four pairs in 9–12. Spermathecae absent.

Distribution. Atlantic species, recorded from Sweden, Great Britain, Germany, Belgium, Switzerland and Austria, introduced into the United States (Sims & Gerard 1985, Zicsi 1994).

Material examined [from the Czech Republic] Bohemia bor., České Švýcarsko National Park, Arba Natural Reserve near Srbská Kamenice village (5151), 7.10 1996, 3 adults, 4 juveniles, leg V. Pižl.

Ecology. Rare endogeic earthworm, occurring mainly in marshes, peat bogs and other wet soils, only occassionaly found in ditches, damp pastures and arable field; soil pH 3.7–7.0 (Sims & Gerard 1985). Czech records are derived from very wet soil of an overflooded meadow, soil pH(H_2O) 4.96.

***Aporrectodea rosea bimastoides* (Cognetti, 1901)**

(Fig. 2)

Description. Length 20–48 mm, diameter 2–3.5 mm, segment number 71–137. Body cylindrical. Colour rosy pink to pinkish grey; unpigmented. Prostomium epilobous 1/2 to 2/3. First dorsal pore in intersegmental furrow 4/5. Male pores on segment 15, between setal lines b and c on distinct but not large tumescences extending somewhat across furrows 14/15 and 15/16. Clitellum on 25–32, saddle shaped Tubercula pubertatis present from segments 29 to 30. Setae closely paired, post-clitellar formula aa:ab:bc:cd.dd = 12:1.5:6:1:29. Genital tumescences surround setae ab on segments 9–12,16 and cd 11–13.

Two pairs of seminal vesicles in segments 11 and 12. Spermathecae absent. Calciferous glands situated in 10th and 11th segments, with lateral tubercles in 10. Septa 6/7 to 10/11 thickened. Crop in segments 15 and 16, gizzard in 17– 1/2 19. Longitudinal muscles of an intermediate type. Nephridial bladders hooked.

Distribution. European element, recorded from Poland, Austria, Italy, Serbia, Greece and Bulgaria (Bouché 1972, Mršic 1991, Zicsi 1994).

Material examined [from the Czech Republic] Moravia bor, Slezské Beskydy Mts, near Nýdek village (6865), 10 9 1996, 6 adults, 4 juveniles; Moravia mer, Podyjí National Park, Podmolí (7161), 24 6 1997, 2 adults, all leg. V Pižl

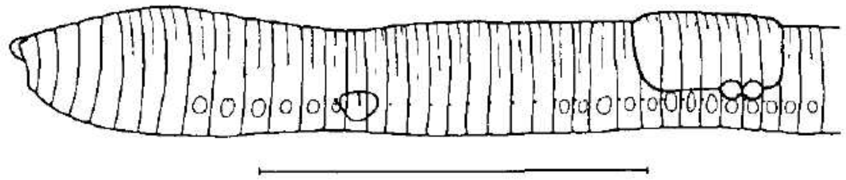
Ecology Hypogeic earthworm, living in mineral soils of forests, meadows, pastures and arable fields (Sims & Gerard 1985). Czech records come from very wet soil in brook source areas located in old beech forests (*Fagetum*), soil pH(H_2O) 3.94 and 4.15, respectively.

***Dendrobaena pygmaea* (Savigny, 1826)**

(Fig. 3)

Description. Lenght 15–35 mm, diameter 0.5–1.5 mm, segment number 90–110. Body cylindrical, gradually tapering posteriorly. Colour lightly reddish dorsally with strong anterior-posterior gradient, postclitellar segments unpigmented, greyish in colour. Prostomium epilobous. Dorsal pores

1



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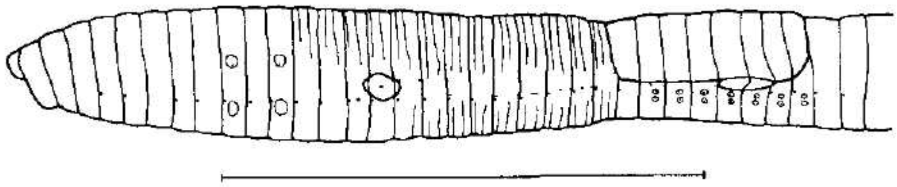

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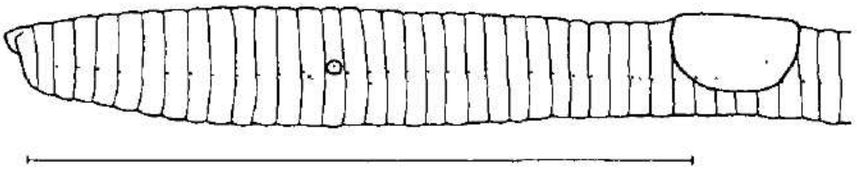

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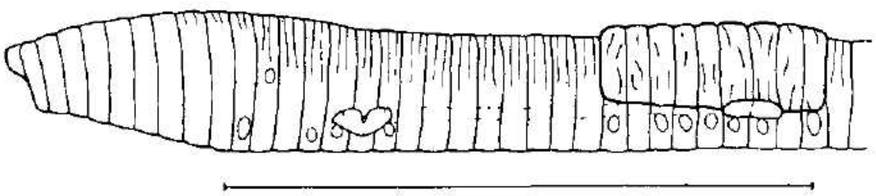

Figs 1–4 1 – *Aporrectodea limicola* Michaelsen, 2 – *A. rosea bimastoides* (Cognetti), 3 – *Dendrobaena pygmaea* (Savigny), 4 – *Proctodrilus opisthoductus* Zicsi. Scale = 1 cm

from intersegmental furrows 4/5 or 5/6, often absent. Male pores on segment 15 between lines b and c carried on whitish tumescences not extending furrows 14/15 and 15/16 Clitellum on segments 32, 33–37, 38, saddle shaped. Tubercula pubertatis form an indistinct ridge below setal line b in segments 35–37, interrupted by intersegmental furrows. Setae distant, post-clitellar formula aa:ab.bc.cd:dd = 1.5:1.2:1.1:1:2.

Anterior septa thin and membranous. Two pairs of seminal vesicles sometimes prasent in segments 11 and 12, often rudimentary or absent.

Distribution. European species, recorded from Germany, Hungary, Italy, Sardinia, Spain, France, Belgium and Great Britain (Sims & Gerard 1985).

Material examined [from the Czech Republic] Moravia mer , Podyjí National Park, near Čížov (7161), 26 4 1997, 2 adults, 30 7 1997, 2 juveniles, Zadní Hamry (7161), 5 9 1997, 1 adult, 23 10 1997, 1 adult, 1 juvenile, all leg V Pižl

Ecology. Epigeic earthworm, living in top layers of well drained soils and in moist litter of deciduous forests (Sims & Gerard 1985). Czech records come from litter and A soil horizons of oak (*Corno-Quercetum*) and hornbeam (*Melampyro nemorosi-Carpinetum typicum*) forests, soil pH(H_2O) 5.75 and 6.43, respectively.

***Proctodrilus opisthoductus* Zicsi, 1985**

(Fig. 4)

Description. Lenght 25–75 mm, diameter 2.5–3.5 mm, segment number 60–135. Body cylindrical. Colour pinkish grey, unpigmented. Prostomium epilobous 1/2, open. First dorsal pore in intersegmental furrow 4/5. Spermathecal pores paired in furrows 9/10/11 between setal lines cd and mD. Male pores on segment 15, between setal lines b and c on large tumescences extending across furrows 14/15 and 15/16. Clitellum on segments 25, 1/2 25 to 33. Tubercula pubertatis (transversal-band like shape) on segment 30 and 31. Setae closely paired, genital tumescences surround setae ab on segments 8,14–16 or 9,10,13,14, or setae cd on segment 11.

Two pairs of seminal vesicles in segments 11 and 12. Spermathecae two pairs in segments 9 and 10, on septa 9/10 and 10/11. Calciferous glands situated in segments 10 to 12, having small lateral tubercles in 10. Septa 6/7–9/10 thickened. Crop in segments 15 and 16, gizzard in 17–18. Typhlosole bifid. Longitudinal muscles of a fasciculate type. Nephridial bladders absent.

Distribution. Central European species, recorded from Austria, Hungary, Slovenia and Serbia (Zicsi 1985).

Material examined [from the Czech Republic] Moravia mer , Pálava Biosphere Reserve (extended concept), floodplain area on the lower reaches of the Dyje and Morava Rivers, near Lany castle (6865), 17 11 1994, 10 adults, 6 juveniles, 15 5 1995, 38 adults, 19 juveniles, 27 6 1995, 32 adults, 8 juveniles, 20 9 1995, 48 adults, 16 juveniles, 9 5 1996, 11 adults, 3 juveniles, 13 6 1996, 3 juveniles, 26 8 1996, 1 adult, 1 juvenile, leg V Pižl.

Ecology. Hypogeic earthworm. Known from mineral soils of forests, meadows and pastures (Zicsi, 1985). My records come from alluvial soil of a floodplain forest, as. *Fraxineto pannonicae – Ulmetum carpinetosum* (Simon, 1957), soil pH(H_2O) 6.43.

DISCUSSION

There are controversies about the correct name of *Dendrobaena pygmaea*, a poorly known and originally imperfectly defined species. Difficulties have arisen because of its variability being connected with the parthenogenesis prevalent among western European populations Bouché (1972) recognised *D pygmaea* (Savigny, 1826) as the rare amphimictic phase and *D cognettii* Michaelsen, 1903 as the commoner parthenogenetic phase lacking dorsal pores, seminal vesicles and spermathecae All central European records made by Zicsi (1991, 1994) were classified as *Dendrobaena cognettii*, in my opinion, however, these should be renamed by the only valid name *D. pygmaea*

Together with the records presented here, 52 species and subspecies are currently known form the Czech Republic

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BOOK REVIEW

FREEDMAN D O (volume editor) **Immunopathogenetic Aspects of Disease Induced by Helminth Parasites** S Karger, Basel, 1997 XII + 235 pp Format 165×240 mm Hardbound, price Sw Fr 284 – (institutions), 142 – (individuals) ISBN 3-8055-6400-7

This monograph appeared in print in the series "Chemical Immunology" as Volume No 66 The list of contributors includes 14 international experts in the field As stated in the preface by the editor, recent years have seen advances in descriptions of immune reactions responsible for pathological lesions induced by helminth parasites Inflammatory response to metazoic parasites appears to be for the most part associated with cytokines produced by Th2 cell subpopulations Emphasis is placed on describing molecular mechanisms utilized by cytokine-sensitive effector cells such as eosinophils, basophils, and mast cells in mediating immunopathology and resistance during nematode infections Special attention is centred upon the significance of the markedly elevated levels of IgE antibody The volume is composed of 9 chapters which provide insights into actual knowledge of imunopathogenesis of major helminthic infections in man Each chapter is structured as a scientific report provided with a list of basic and actual references exceeding mostly 100 quotations The textual part is illustrated by 37 figures and pictorial groups composed of presentations of life cycles and biological phenomena, photographs of organ and tissue lesions, sonograms CT- and MR-scans, and some laboratory procedures Chapter 1 analyses the basis of IgE responses to specific antigenic determinants in helminthiasis Helminth parasites induce production of IgE antibodies, together with peripheral and tissue eosinophilia and mucosal mastocytosis Examined are the regula*tion of IgE immune responses in helminthic infections, the role of IgE in animal models and in humans, antigens* and allergens from helminths, proteases and proteins Chapter 2 features immunopathology of onchocerciasis and the role for eosinophils in onchocercal dermatitis and keratitis Onchocerciasis is a leading cause of infectious blindness Eosinophils have an important role in pathogenesis of onchocercal inflammatory lesions Chapter 3 introduces enteric helminth infection, and immunopathology and resistance during intestinal nematode infection Enteric helminth infections of both animals and man are some of the most ubiquitous parasite infections globally Outlined are intestinal pathology associated with infection, immunologically mediated intestinal pathology, and functions of various mechanisms and factors Chapter 4 is concerned with pathogenesis of human hookworm infection Discussed are cutaneous and pulmonary manifestations of larval invasion clinical features and histopathology of intestinal infection, immunological responses and pathogenesis Special attention is centred upon recently emerging problem of human eosinophilic gastroenteritis caused by Ancylostoma caninum, a common dog hookworm Chapter 5 deals with human toxocariasis and the visceral larva migrans (VLM) syndrome Nonhuman ascarids are capable of limited development in humans as abnormal hosts – larvae wandering through the tissues produce VLM syndrome consisting of hypereosinophilia, hepatosplenomegaly, hyperglobulinaemia and Loeffler s pneumonia Chapter 6 centres attention upon lymphatic filariasis As stated here, despite nearly 100 years of clinical, epidemiological and laboratory work our understanding of this parasitic disease is incomplete and many fundamental questions remain unanswered Particular paragraphs of this chapter focus on biology of filarial worms, on epidemiology and occurence, clinical features, histopathology and immune responses Chapter 7 provides insights into immunological basis of disease and disease regulation in schistosomiasis Examined are acute toxaemic and chronic granulomatous features of schistosomiasis, immunopathogenesis of circumoval granulomas and the role of cytokines in granuloma formation, immune downregulation (modulation) of granulomatous response and fibrotic reactions induced by schistosome eggs Chapter 8 centres attention upon immunopathology of echinococcosis Investigations of cell mediated immunity indicate involvement of interferon gamma and macrophage activation Strategies of metacestode survival postulates the parasite modulation of molecular immunogenicity and diversification of the host immune response Concluding Chapter 9 features the Taenia solium cysticercosis Enzyme-linked immunotransfer blot assay identified seroprevalence rates of 4 9–22 6% among inhabitanst of endemic villages in Latin America There is a complex interaction between taeniid parasites and intermerdiary hosts *While the oncospheres are susceptible to antibody and complement, the metacestodes are* protected by evasion mechanisms Parasite molecules interfere with the host response The textual information is illustrated by 37 figures and pictorial groups composed of presentations of biological cycles diagrams, photographs of organ and tissue lesions, sonograms, CT- and MR-scans, and some laboratory procedures (amino acids sequences, immunoblotting) Moreover, there are five summary-type tables This exceptional monograph provides a comprehensive overview of recent advances in immunobiology of helminthic diseases in humans and presents an essential complement to basic textbooks of medical helminthology and tropical medicine

Jindrich Jira

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Field observations on the biology of *Copris lunaris* (Coleoptera: Scarabaeidae)

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Abstract. Field data on the bionomy and ethology of adult *Copris lunaris* (Linnaeus, 1758) from Slovakia are presented and discussed. The following observations are described: records of individuals feeding on human faeces, mating and mating behavior, and flight activity. Evening flight activity and initial phase of mating behavior on the ground after arrival at fresh droppings was observed in April at a temperature of 9 °C. A hypothesis is formulated, that pairs are formed at this time and not only after the formation of the feeding burrow, at least in a part of the population. In one case, one female was found in a feeding burrow together with two males. This indicates the possibility of the existence of oligoandry or sexual promiscuity of beetles in the pre-breeding period. A female, a male, a brood ball with an egg and a dry splitters of dung "cake" were found in a nest at the end of June.

Biology, ethology, Coleoptera, Scarabaeidae, Coprinae, *Copris lunaris*, Central Europe

INTRODUCTION

European species of the genus *Copris* O. F. Müller, 1764 became classical subject of the research of breeding behavior of dung beetles in the course of the last century. This applies particularly to *C. hispanus* (Linnaeus, 1764) and *C. lunaris* (Linnaeus, 1758), the biology of which is already rather well known (see e. g. Fabre 1897, 1899; Siyazov 1913; Lengerken 1954; Teichert 1960; Rommel 1961, 1967; Klemperer 1982a, b). Their mating and fighting behavior remains least studied, due to their secretive style of life in the reproductive period (cf. Rommel 1967, Klemperer 1982a).

The data presented here were obtained during a faunistic research in Slovakia in the years 1985–1991. They regard bionomy and ethology of *C. lunaris* and may broaden the published knowledge of the life habits of this species.

METHODS

Behavior of beetles was observed at a distance of 30–100 cm (see Results and discussion, part C6). The studied ground patch was illuminated by portable fluorescent tube *PŽS-01 (Služba, Nitra), 6 W*, range of waves and color temperature unknown. Temperature was measured on most occasions. Lower end of the thermometer was usually inserted 5 cm deep in the soil (labeled as "soil", see Results for other cases). The thermometer was laid down in some cases on the ground on a non-shadowed place (labeled as "surface"). The temperature was noted after ca. 10 minutes. Time data refer to CET. Domestic animals commonly encountered on each locality are given in the chapter "Results and discussion" after the name of each locality. The presented data consider dung of these animals, if not stated otherwise.

Abbreviations of observers are as follows: JV, PŠ and PM = J. Vitner, P. Šrůta and P. Morávek, respectively.

LOCALITIES

Characteristics of localities at which the observations were made are listed below Numbers in parentheses after each locality name correspond to number of quadrates in the faunistic grid map of Zelený (1972) All localities served as pastures through the whole season, i e from the 2^{nd} half of April through early November Basic climatological data are extracted from Syrový (1958) It is long-term means for the years 1901–1950

The following abbreviations are used T1 = mean air temperature per year, T2 = mean air temperature in January, T3 = mean air temperature in July, P1 = mean precipitation per year, P2 = mean precipitation in vegetation season (April through September). Temperature is given in °C, precipitation is given in mm

Slovakia mer occ , Podunajská nížina lowland, Búč (8176), 47° 49' N 18° 27' E· 110 m a s.l. Grassy flatland pasture at alluvia of the Danube river. T1 = 9–11, T2 = >–1, T3 = 20–21, P1 = 550-600, P2 = 300–350

Slovakia mer centr , Cerova vrchovina highlands, Hajnáčka (7785), 48° 13' N 19° 57' E ca 280–360 m a s l. Grassy pasture on deep clay ground with remains of uncultured orchards. Broken surface, various slopes (locally up to 60°), mostly exposed to the south or southwest T1 = 8–9, T2 = -2 to –3, T3 = 19–20, P1 = 600–650, P2 = 350-400

Slovakia mer or , Slovensky kras karst, Hrhov (7390), 48° 36' N 20° 45' E ca. 250 m a.s l Grassland pasture on limestones, locally thinly forrested, shallow soil, slopes mostly exposed to the south T1 = 8–9, T2 = –2 to –3, T3 = 18–19, P1 = 600–650, P2 = 350–400

Slovakia mer or , Slovensky kras karst, Hrhov/Zádiel (7390), 48° 37' N 20° 48' E between Nagy Varad hill and Zádiel village, 250–300 m a s l Basic characteristics as in the preceding locality, slopes mostly exposed to the south T1 = 8-9, T2 = –2 to –3, T3 = 18–20, P1 = 600–650, P2 = 350–400.

Slovakia mer or , Slovensky kras karst, Silica (7489), 48° 33' N 20° 31' E: 550–600 m a s.l. Basic characteristics as in the preceding locality, broken ground, exposition of slopes variable. T1 = 7–8, T2 = –3 to –4, T3 = 17–18, P1 = 700–800, P2 = 400-450.

Slovakia mer or , Slovensky kras karst, Silická Brezová (7488), 48° 32' N 20° 29' E 450–500 m a s.l Basic characteristics as in the preceding locality, broken ground, exposition of slopes variable. T1 = 7–8, T2 = –3 to –4, T3 = *16–18, P1 = 700–800, P2 = 350–400*

RESULTS AND DISCUSSION

A. Faeces of omnivorous animals as a food source

1. Hajnáčka, *Ovis*, 8.v.1987, 13:30. [Bright weather, wind, surface temperature not measured, soil temperature at 08:00 = 14 °C. The day before (7.v.) was sunny and warm over day, in the evening almost overcast; soil temperature at 15:50 = 20 °C, at 18:00 = 12.5 °C.]

One female was found in a feeding burrow under an approximately one-day old piece of faeces of *Homo*.

In addition, 17 adult *C. lunaris* were found in feeding burrows beneath the faeces of *Ovis* (overall, 82 droppings were controlled) and 1 adult *C. lunaris* was found beneath a dung pad of *Equus*. (JV).

2. Hrhov, *Ovis* and *Bos*, 22.ix.1991, 11:45. [The weather on this day and the day before was warm, dry, partly overcast, sometimes cloudy. Surface temperature on 21.ix. at 14:30 = 25.5 °C.]

One female was found beneath a piece of human faeces, produced on 21.ix. approximately at 14:30, burrowed just beneath the soil surface. The following dung beetles were found in faeces or just beneath them: 3 *Geotrupes spiniger* (Marsham, 1802), ca. 20 *Trypocopris vernalis* (Linnaeus, 1758), 2 *Onthophagus coenobita* (Herbst, 1783), ca. 40 *O. fracticornis* (Preyssler, 1790), ca. 50 *O.* cf. *ovatus* (Linnaeus, 1767), 3 *Aphodius sticticus* (Panzer, 1798), 1 *A. melanostictus* W. L. Schmidt, 1840, and 1 *A rufus* (Moll, 1782). (JV).

In addition, one male was found in a shallow feeding burrow (depth ca. 2 cm) beneath a sheep dropping (24 droppings were controlled), and one male in a shallow feeding burrow (depth ca. 5 cm) beneath a cattle dung pad (52 pads were controlled). (JV & PŠ).

DISCUSSION. Rommel (1967) concluded on the basis of field and laboratory observations, that adult *C. lunaris* feed on the dung of herbivores, but reject human and dog faeces. The range of food sources, especially during the feeding period, is probably much broader (cf. the data of Abramov (1968), who indicated that *C. lunaris* is facultatively necrophagous). Rommel (1961) observed that dog and human faeces can be used by adult *C. hispanus* as food and as material for the formation of brood balls. See also data on several further species of *Copris* in Halffter & Matthews (1966).

With the exception of the above mentioned observations I found *C. lunaris* (together ca. 370 individuals) in Slovakia always in the dung of ungulates. Interesting is the observation from Hajnáčka, if we accept the following characteristics by Klemperer (1986): "*Copris* species with annual life cycles have the low maximum rates of increase that characterize a species whose stable population size is close to the carrying capacity of a predictable environment". Over 200 sheep pastured daily at this locality between April and November in the 1980s (till the early 1990s), so that human faeces could not serve here as a substitute food source.

B. Diel activity

1. Hajnáčka, *Ovis*, 25.iv.1990, 18:45–21:05. [Surface temperature at 18:45 = 10.5 °C, at 21:05 = 9 °C. For the remaining data on weather and temperature see part C6.]

One female landed at a fresh dropping at dusk (at 19:25). Another female was seen at the same time flying out of grass. One female was caught in flight ca. 60 cm above ground at 19:40 (almost dark). In addition to this, buzzing of flying *C. lunaris* was heard at least ten times during the dusk and in the darkness. (JV). For observations on the activity on ground see also part C6.

2. Silica, *Ovis* and *Bos*, 18.vi.1990, 20:23. [Overcast, surface temperature at 12:45 = 28 °C, at 17.15 = 24 °C, and at 20:00 = 14 °C.]

One male was caught in flight ca. 50 cm above ground. (JV).

3. Silica, *Ovis* and *Bos*, 7.vii.1987, 20:55. [Warm, calm, temperature not measured.]

One male was found creeping on ground. (JV).

DISCUSSION. Observations presented above are in agreement with published data on the diel activity of this species (Rommel 1967, see also Klemperer 1982a, b). The observation sub B1 is discussed in part C6.

C. Male-female interactions and nesting

Remarkable finds in feeding burrows, without observations of behavior

1. Silická Brezová, *Ovis*, 21.v.1986, 10:30–15:00. [Sunny, soil temperature at 11.15 = 24 °C, surface temperature at 11:15 = 29 °C.]

Two males and one female were found together in a shallow (depth <10 cm) feeding burrow. Supply of dung was almost fed up, only a heap of scraped out soil was on the ground. (JV).

2. Hajnáčka, *Ovis*, 24.iv.1990, ca. 14:00. [For conditions see part C6.]

Two feeding burrows, each ca. 6 cm deep, were found beneath a dropping some 15 cm from each other. They were filled with fresh dung. One of the burrows was inhabited by a male, while a female was found in the other burrow. (JV).

DISCUSSION. The circumstances (daytime, temperature) of the record of two males and one female in a single feeding burrow indicate that the three beetles lived there together for some time. This may indicate that mating behavior is complicated in *C. lunaris*, that it is variable and the arrival of additional male into a burrow may not expressed in fighting behavior immediately in all cases (for comparison see Rommel (1967)). Similarly, it is impossible to exclude oligoandry or sexual promiscuity in the period before nest building. [Cf. in this respect Klemperer's (1983a) speculation on further sexual activity of males after their expulsion from the nest.]

The find of two burrows beneath a single dropping is in accordance with the observations by Rommel (1967).

Mating and nesting behavior

3. Silická Brezová, *Ovis*, 21.v.1986. For conditions see part C1.

Overall, 105 adult *C. lunaris* were found, usually singly in feeding burrows. (JV & PŠ). Mating and nesting behavior was observed in the following cases:

a) A pair was found while pulling a dropping in a burrow. The dropping was roughly globular, its dimensions being 5x4x4 cm. Nest gallery was present, its roof was ca. 8 cm below ground. (JV).

b) A pair in copula was found in a horizontal passage between dropping and ground. Abdomina of the beetles were oriented towards the opening of the tunnel. Behavior during copulation was not observed, because the beetles interrupted it after the arrival of the observer. (It was not decided whether the burrow was a feeding burrow or a nest.) (PŠ).

c) A pair was found at an undivided dung "cake" in a nest gallery. The roof of the gallery was ca. 6 cm below ground. (JV).

4. Hrhov/Zádiel, *Ovis* and *Bos*, 24.vi.1986, ca. 12:00–13:00. [Sunny, dry, soil temperature on 23.vi. at 16:10 = 25 °C, surface temperature on 23.vi. at 16:10 = 27 °C, at 21:15 = 14.5 °C, on 24.vi. at 9:30 = 31 °C.]

A male, a female, one brood ball with an egg and a number of dry splitters of dung were found in a nesting gallery beneath a dry remnant of a sheep dropping and ca. 10–15 cm of soil. The clump of dung splitters were larger that the brood ball.

In addition to these individuals, only two *C. lunaris* were found here on 23.–24.vi., both in feeding burrows. one male of beneath an sheep dropping (53 droppings were controlled) and one female beneath a cattle dung pad (13 pads were controlled). (JV).

5. Búč, *Ovis*, 1.vi.1987, ca. 10:00. [Sunny, soil temperature on 31.v. at 17:30 = 21 °C, surface temperature on 31 v. at 17:30 = 18 °C (in shadow) and on 1.vi. at 08:00 = 31 °C (non-shadowed place).]

Only one adult *C. lunaris* was found (64 droppings were controled on 31.v.–1.vi., JV & PŠ).

A female was found in a nest gallery beneath an undivided dung "cake". A slanting tunnel led to the gallery ca. 10 cm below ground. Height of the gallery was ca. 10 cm. Size of the "cake" was ca. 10x10x10 cm. The dung almost completely filled the gallery. Male was absent from the nest. (JV).

6. Hajnáčka, *Ovis*, 24.–26 iv.1990. [Heavy rains in preceding days. On 24.iv. (observations made at 13:00–17.10) weather changing, mostly overcast, mild wind, at 14:10–14.30 and at 15:00–15:20 slight rain, from 17:30 till deep night heavy rains. On 25.iv. (observations made at 18:45–21:05) sunny until ca. 10:00 (inversion fog in the morning), later weather changeable. On 26 iv. (observations made at 11:00–17:30) weather changing, in the morning locally sunny, in the afternoon mostly overcast, rather strong wind, soil still moist after the rain from 24./25.iv. Temperature of soil on 24.iv. at 13:20 = 15 °C, on 25.iv. at 12:10 = 14 °C, on 26.iv. at 11.30 = 15 °C. Temperature of surface on 24.iv. at 13:20 = 21 °C, on 25.iv. at 12:10 = 31 °C, at 18:45 = 10.5 °C, at 21:05 = 9 °C, on 26.iv. at 11:30 = 17 °C, at 14:30 = 27 °C. Temperature of surface in shadow: on 25.iv. at 12:10 = 23 °C, on 26.iv. at 14:30 = 21 °C, at 17:00 = 16.5 °C.]

A total of 150 droppings were controlled, 32 individuals of *C. lunaris* were found (JV, PŠ & PM). Behavior was observed in the following cases:

a) 24.iv. at ca. 13:30: Only a heap of soil was visible from outside, but no dropping. A male was outside at the opening of the tunnel, a female was sitting in the tunnel, showing anterior part of her body. The tunnel led in the depth of ca. 20 cm, probably to a nest gallery with an undivided dung "cake" (not digged out by myself). (JV).

b) 24.iv. at 14:55 (overcast): An unearthed heap of soil, horizontal passage and adjacent opening of the tunnel open, visible from outside. A few small droppings (diameter ca. 1.5 cm) were laying at the heap of soil. Female is crawling from the horizontal passage beneath the heap of soil into the tunnel, head first. The male is on the ground, moving backwards one of the droppings with his first pair of legs to the opening of the tunnel. (JV). Same nest on 24.iv. at ca. 15:30: A male and behind him a female are sitting in the tunnel, next to its opening. The male crawled backwards to the female and fondled her abdomen from below with his clypeus and from above with his forelegs. During the forthcoming copulation the male pushed the female at the level of the ground and then they again crawled somewhat back. The pair was collected after 10 minutes of copulation and their nest with nest gallery was digged out. (PM).

c) 25.iv. at 19:50–20:00 (in darkness): A male and a female are crawling around a fresh dropping at 19:50, mating behavior was not observed. The female was still on grass, while the male was sitting on the top of the dung at 20:00. This dropping was controlled again on 26.iv. at 11:30, but no individuals of *C. lunaris* were found. The interior of the dropping was completely eaten by smaller species of dung beetles. The following beetles were found in it: 2 *Onthophagus lemur* (Fabricius, 1781), 1 *O. verticicornis* (Laicharting, 1781) and ca. 5 *Aphodius luridus* (Fabricius, 1775). (JV).

d) 25.iv. at 20:02: A male was observed crawling around another fresh dropping. A female crawling on grass was found a few meters apart at 20:05, caught and immediately brought to the male. The male started to follow the female around the dropping and beneath it, fondled the upper side of her abdomen with his forelegs and touched its ventral side by his clypeus. The male attempted to crawl on the female at 20:20, but she escaped the attempt. Both then crawled beneath the dropping. The situation was subsequently controlled in intervals of 5 minutes, but no changes were observed. Only the female was found under the dropping at 20:40, while the male was absent. (JV, PŠ & PM). The dropping was next controlled on 26.iv. at ca. 12:00 and the following beetles were found in it: 1 *Onthophagus fracticornis*, ca. 5 *O. lemur*, ca. 5 *O.* cf. *ovatus*, 1 *O. verticicornis*, ca. 25 *Aphodius luridus*. In addition, a male of *C. lunaris* was found in a feeding burrow ca. 8 cm beneath the dropping. (JV).

DISCUSSION. Most nests were found in May–June (see parts C3–5), which agrees with the data by Teichert (1960), Rommel (1967) and Klemperer (1982a). It follows from the observations mentioned sub C6, that mating behavior starts in the study area, i.e. in the southern part of Central Europe, already in the late April. These observations (cf. C6b) also indicate, that nesting can start – under some, not yet known conditions – by 3–4 weeks earlier than assumed, and that its start is asynchronous within a population (see observations C6a–b vs. C6c–d).

I consider the possibility that a considerable part of the natural population in Slovakia mates already in the fall, as observed under laboratory conditions by Klemperer (1982a), improbable, because of adverse climatic conditions: Night temperatures fall to zero, or below it, already in the first half of October, or even in late September. Nevertheless, night temperatures sufficient for flight acitivity are rather low (see parts B1 and C6). Taken into account the possibility that the beetles are active in the early morning (see Rommel 1967), minimum temperatures required are probably 5–9 °C.

The observation C6d indicates that mating behavior starts in some cases already in April (see also C6a and C6b) and that it is initiated on the ground, when beetles meet after arriving at fresh piece of dung. The initial phase of the mating behavior is similar to that observed in representatives of the genus *Phanaeus* MacLeay, 1819 (Halffter & Lopez 1977, Halffter & Edmonds 1982). Observations of the behavior between the initial phase and proper copulation are not available yet (cf. Klemperer 1982a). It remains unclear, whether beetles can copulate on the ground, as this never was observed. It is also unknown, how many times a female copulates before she forms a dung "cake" suitable for forming brood balls. [Some indications are presented by laboratory observations of copulations shortly after hatching of adults in the fall (Klemperer 1982a) and by the description of fighting behavior by Rommel (1967). See also observations C3b and C6b.] I regard as probable that a pair copulates repeatedly and that first copulation can happen on the ground. It would be a certain analogy to the behavior observed in the genus *Phanaeus* (Halffter & Lopez 1977) and to repeated copulation observed in *Copris incertus* Say, 1835 by Martínez et al. (1996).

It is worth mentioning that the risk of predation and adverse abiotic factors would be low during copulation on the ground in darkness in April, i.e. under rather low temperatures. Subsequent copulation(s) would not take place on ground and the time of day would not play here any decisive role (cf. observations C3b and C6b). However, the data available are insufficient to such a degree, that it is impossible to present a closer approximation.

Another conclusion which follows from the observation C6d is that pairs are formed in *C. lunaris* – at least sometimes – shortly after the arrival of beetles at a fresh piece of dung, not only after building of a feeding burrow.

The observation C4 shows that a female of *C. lunaris* under natural conditions can tolerate a male in the nest also after the building of brood balls started (cf. Klemperer 1982a, 1983b). Similar observations are available for *C. hispanus* (Lengerken 1954, Rommel 1961). The observed situation (single brood ball with an egg, rest of the dung "cake" destroyed) is difficult to interprete. The destroyed part of the "cake" was in splitters over 0.5 cm in diameter, being thus not consumed by *C. lunaris*.

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BOOK REVIEW

ROBERTS L S, JANOVY, Jr J **Gerald D. Schmidt & Larry S. Roberts' Foundations of Parasitology** Sixth Edition McGraw-Hill Higher Education, a Division of the McGraw-Hill Companies, Boston Burr Ridge IL *Dubuque IA, Madison, WI, New York, San Francisco, St Louis, Bangkok, Bogota, Caracas, etc, 1999 (Copyright* 2000) XVIII+670 pages Format 230×275 mm Hard cover Price Lstg 69 99 ISBN 0-697-42430-8

The sixth edition of this encyclopaedic textbook of parasitology follows the format of previous editions – for review of the fourth edition see *Acta Soc Zool Bohemoslov* 55, 1991, p 160 The authors are affiliated with the universities in Miami and Nebraska Lincoln This edition integrates a wealth of latest advances, particularly in the field of global prevalence of various parasitic infections, epidemiology, classification and taxonomy, molecular biology and immunology New pictorial presentations created W C Ober and Claire W Garrison The volume is composed of 40 chapters

Introductory chapters 1 through 3 are intended to present basic principles of parasitology Discussed are terms and definitions, parasite ecology and evolution, notably the host as environment, adaptations for parasitic style of life evolutionary associations and biological cycles Basic principles and concepts of immunology and pathology of *parasitic infections encompass innate defence mechanisms, acquired immune responses in invertebrates and* vertebrates and pathogenesis of parasitic infections Chapters 4 through 11 move into the area of protozoic parasites The chapter on morphology, physiology and classification presents a modern conception of protozoan phyla based primarily on classification schemes of Cavalier-Smith, Corliss, and Hausmann & Hulsmann Outlined are also new data on opportunistic parasites, on *Entamoeba dispar*, *Cyclospora cayetanensis*, *Neospora caninum* and the microsporidians

Chapter 12 analyses the Mesozoa, giving to them the attribute pioneers or degenerates Chapters 13 through 30 provide access to helminths Introduction to the phylum Platyhelminthes takes into consideration new aspects of phylogenetic classification by Brooks & McLennan, Ehlers, and Rohde In particular, attention is given to the subsuperclass Neodermata - platyhelminths shedding their epidermis at the end of the free living larval stage Medically important groups are represented here by strigeiform, echinostomatiform, plagiorchiform and opisthorchiform digeneans In following two chapters described are form, function and classification of tapeworms Reviewed here are taxonomic schemes enclosing the classification of the newly introduced subclass Cercomeromorphae In subsequent nine chapters analyzed are particular orders of nematodes representing the most abundant animals on earth and causative agents of most debilitating diseases in humans New information lays emphasis on the control of host gene expression by trichinellae, updated material on diagnosis and treatment for hookworm, on filarial worms, and more

Chapters 31 and 32 examine the phyla Acanthocephala and Pentastomida Chapter 33 embraces a general description of arthropods Chapter 34 characterizes parasitic crustaceans – some of their parasitic forms have been changed in such a way that they previously used to be regarded as worms or molluscs Concluding chapters 35 through 40 analyse parasitic insects and arachnids Among the numerous revisions of the chapters on arthropods looked at are salivary secretions of mosquitoes and sand flies, coverage of kairomones and their effect on parasitoids, updated material on phylogenetic relationships and synonymy

In addition, there is a comprehensive glossary of morphological, physiological, taxonomical names and terms of various life forms of parasite biological cycles and also of essential terms relevant to related sciences immunology pathology and diagnostics Each chapter is provided with references to pioneering as well as to actual literature sometimes exceeding 100 quotations The volume is illustrated by numerous informative figures (numbered by individual chapters) composed of line drawings, photographs and diagrams featuring parasites and their hosts, ecological aspects, pathological lesions, phylogenetic trees, metabolic pathways, geographical charts, and more

Respectable number of previous editions offers evidence of credible scientific and educational value of this textbook Large body of information condensed by the two authors usually requires dozens of collaborators in handbooks of similar extent The book represents an outstanding aid for both undergraduate and postgraduate students in biological, medical and veterinary courses

Jindrich Jira

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In memoriam Professor Alexej Romanovský (January 13, 1932 – July 26, 1999)

Dr Alexej Romanovský, professor of General and Developmental Biology at the Faculty of Science, Charles University in Prague, died after a long illness at 68 years of age.

A. Romanovský, the only son of a Russian emigree, was born to a Czech mother in 1932 in Prague. He was interested in the study of nature at an early age and this led him, after finishing the Secondary School, to the Faculty of Science at Charles University in Prague, where he graduated in 1954 in Zoology. He was first interested in fish parasitology, but later he shifted his scientific interest to developmental biology and cell differentiation in particular, studying processes of neural tube formation in context with inductive interactions in Amphibian embryos. In 1958 he got his Ph.D. in General Biology on the basis of his dissertation work concerning regeneration of central nervous system in *Ambystoma* embryos. In 1990 he was awarded Doctor of Science degree (Dr.Sc.) after presenting a review work on antigenic differentiation of cells in early Amphibian embryonic stages. His work was internationally recognized and he collaborated with many European embryologists, namely with those in Scotland, France and Poland.

A. Romanovský devoted all his enthusiasms and activities to his mother Faculty and University. He was appointed assistant in 1954, associated assistant in 1958, associated professor 1965 and became full professor in 1991. In 1967 he was appointed vicedean and in years 1991 – 1994 he was serving as the head of the Chair of Physiology and Developmental Biology. In his later years his activities were focused on postgraduate studies in Immunology. He retired in 1997, but remained active serving as chairman of the Committee for Postgraduate Studies in Developmental Biology and Immunology. For his scientific and organizing activities he was awarded Silver Medal of the Faculty of Science, Silver Medal of the Charles University and J. Ev. Purkyně Medal of the Czechoslovak Biological Society. In 1997 he become Honorary member of the Czechoslovak Biological Society. For many years he was a member of the International Society of Developmental Biologists.

Lexa, as he wished his friends to call him, was a much respected contributor to his field in the Czech Republic and his accomplishments and efforts for the progress in Developmental Biology will be long appreciated by his many colleagues and pupils. His friends will miss him for his quiet, unassuming and gentle manner as well as for his warm and sensitive personality. He was good man.

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